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the POPULATION CHALLENGE

. . . what it means to America

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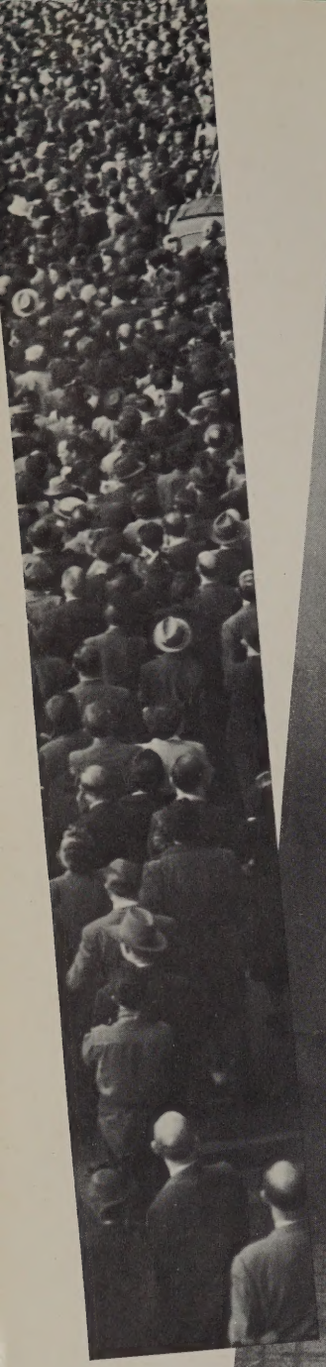
UNITED STATES DEPARTMENT OF THE INTERIOR CONSERVATION YEARBOOK NO. 2



Chicago Tribune

Richard Erdoes

The Black Hills, South Dakota

Is our limited legacy of natural resources on a collision course with an expanding population?

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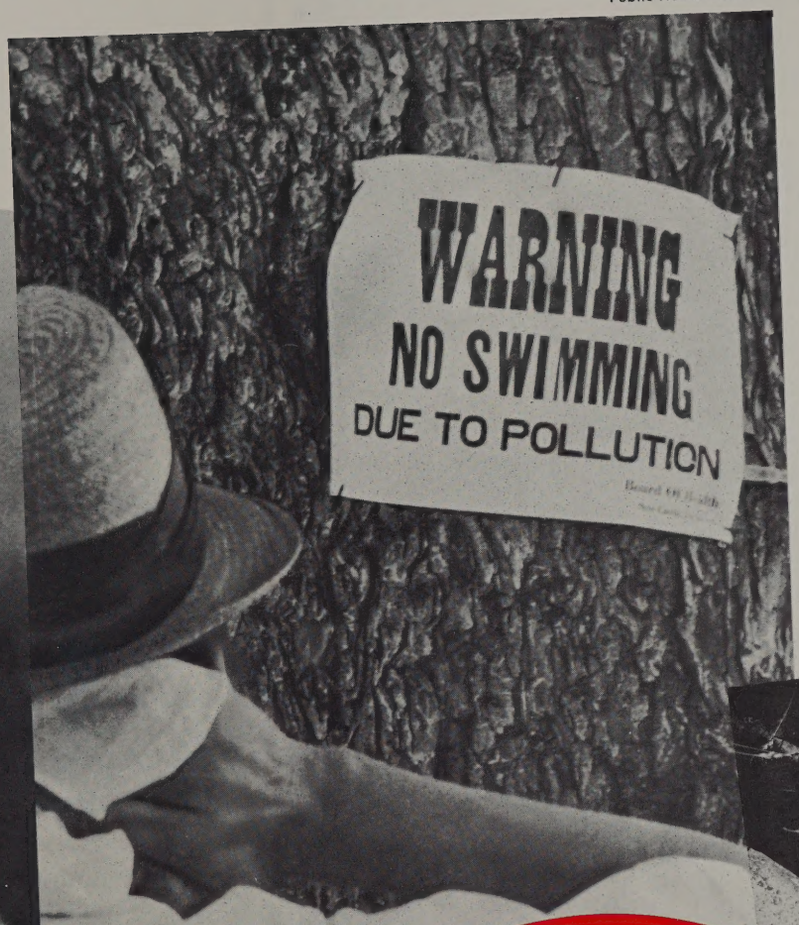
Public Health Service



John Shrader

the POPULATION CHALLENGE

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Laurence Lowry—American Heritage

Black Canyon of the Gunnison, Colorado

"I will seek new ways to use our knowledge to help deal with the explosion in world population and the growing scarcity in world resources."

President Lyndon B. Johnson

Foreword

Today we face a grave and subtle conservation challenge—one which may affect our future more vitally than many a sensational subject of the daily banner headlines. The challenge is that of a soaring population, a shrinking allotment of space per person, and the gathering storm of conflict over how to apportion available space, how to stretch natural resources, how to preserve the quality of our environment.

Should our population continue growing, even at the present "declining" rate, it would double in about another four decades and then double again in less time than that. Ultimately, there would be no horizontal spread left in this land. We should have to start spreading vertically. What this would mean in terms of living conditions can be imagined, but the prospect is not a pleasant one. You can double-deck freeways, railroads, even whole cities. But you can't double-deck a park.

The greatest threat to quality living in this country is overpopulation and we need a lot more public education on this subject. What size population can this country reasonably and beautifully support? What should be the limits of environment for every region and every city?

In layman's language, the gist of a report made in January 1965 by the American Association for the Advancement of Science is that man has been using his power to alter his environment—with a blind pursuit of immediate objectives and a disregard of secondary effects that could endanger the very existence of life on this planet. It cites synthetic invasions of the web of life which add up to an appalling list of governmental and private errors. These errors range from the mistake in judging the holes which nuclear explosions in the stratosphere would tear in the Van Allen radiation belt surrounding the earth to the unanticipated environmental contamination produced by indiscriminate use of pesticides.

The National Academy of Science's National Research Council has pointed out the relationship of diminished resources to a swelling population. In a report, *The Growth of U.S. Population*, published May 25, 1965, the Council's Committee on Population warns that "rapid population growth will create difficulties in reaching America's noble goals of optimum education of all, universal abundance, enriched leisure, equal opportunity, quality, beauty, and creativity."

That report examines the growing drain upon outdoor recreation facilities, nonrenewable resources, and living space, and attributes part of this drain to the growing number of people. It cautions further that while the rate of natural population increase in the United States at the moment is slackening, if present trends were to persist "in the very long run, continued growth of the U.S. population would first become intolerable and then physically impossible."

Others have warned against the disastrous pressure which could result from a constantly growing population—straining our resources and threaten-

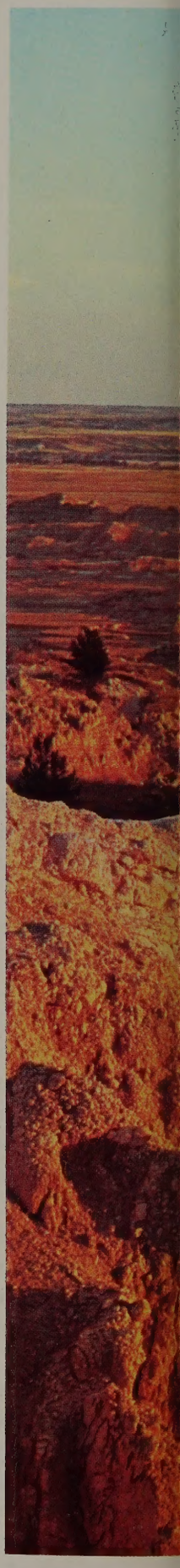
ing to erode the very keystone of civilized life. "If we do not act soon," Sir Julian Huxley wrote recently, "man will become the cancer of the planet, destroying its resources and eventually his own future self."

Every present sign is urging us to reassess the material base on which we must support our increasing population. In a truly Great Society, conservation takes a new orientation, reaching out to encompass quality of total environment; considering the rivers that once graced and now too often disgrace our cities; pitting a critical eye and a creative brain against the mounting tide of litter and contamination; pondering how to stretch our resources to cover the demands of a mushrooming population while still preserving the quality of existence; respecting the rightful claims of creatures that inhabit many an obscure and threatened ecological niche. And, perhaps most significantly, it asks: "What will be the quality of our existence?"

For the conservation challenge of today is essentially one of quality. Technology holds the key to survival for years to come, if we are to believe the scientists. But what *kind* of survival. Glassed-in, air-conditioned living-boxes, with elbow-to-elbow barbecue pits and wall-to-wall frustrations hardly add up to quality, even though the pits are replete with steaks and the armchair table sports a box of chocolate creams.

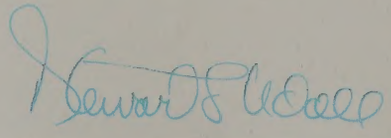
Our highest aims can be realized only if we face squarely the fact that we must have adequate resources if we are to have a quality existence. But now we must move to define the word "adequate." We are beginning to see that it includes purity of surroundings, an opportunity to stretch, a chance for solitude and quiet reflection.

I believe that Henry David Thoreau's decision to "live deliberately"—to absorb the natural world around him, not merely through the senses into his physical being but into his deepest thoughts—to scorn artificiality and find richness in simplicity—is the nutrient of great culture and of a more peaceful world order.



"People minus Space equals Poverty. This is true whether that space is a slum dwelling, a college classroom, a job opportunity, or a National Park."

Marya Mannes



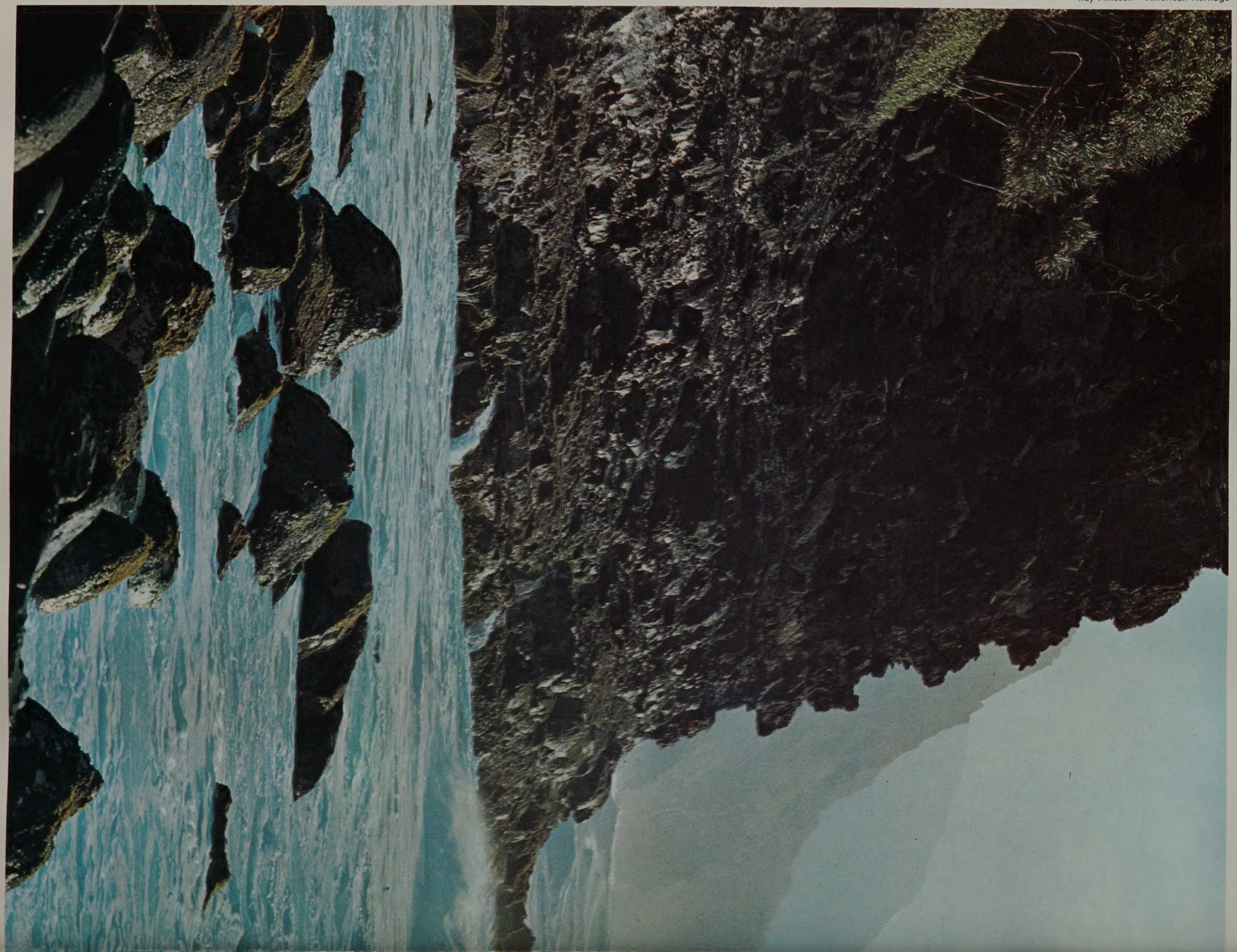
SECRETARY OF THE INTERIOR

Richard Erdoes—American Heritage

South Dakota's Badlands

Hawaii's Island of Kauai

Ray Atkeson—American Heritage



America the Beautiful Land or...

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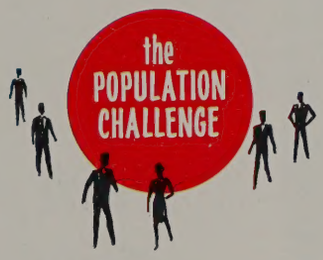
The Department of the Interior wishes to extend its appreciation to these firms, who have made this color possible.

. . . America the Wasteland.

Herbert Loebel—Horizon

A Rationed Tomorrow

Survival . . . barely or beautifully? Resources . . . marginal or magnificent?



Introduction

Even as lately as yesterday, the people of the United States were secure in a seemingly endless earth and confident of boundless bounty.

Today there is still plenty of everything to go around. But more and more people are beginning to watch more and more anxiously as science and technology attempt to stretch a predictably finite wealth of natural resources to cover ever-growing demands.

The handwriting on our natural resources wall could read: "A rationed tomorrow."

Twentieth century man in the United States must choose—and the fact that we have a choice is strictly a matter of geography. In most parts of the world, a quality society is unattainable in the foreseeable future.

Currently we are in the seventh decade of a 100-year-span that began in 1900 with a world population of fewer than 1½ billion persons. That same population is now hurtling toward 3½ billions.

The relationship of living things with one another and with their total environment, known as ecology, poses a gigantic question mark over a future of increasing population and diminishing resources.

People are unquestionably our most precious resource. It is in relation to people that every other resource takes on meaning. This report will attempt to assess people in relation to their world and the impact of people on certain aspects of their total environment, such as water, parks, open spaces, minerals, fuels, and wildlife.

Under a broad and amplified concept of "conservation," attempts are being made to soften the impact of the problems posed by population increase. To fulfill our obligation as stewards of all resources, people must have satisfying and wholesome relationships with their environment. Each person must have elbow room and opportunity for occasional solitude. He must be spared excessive noise and pollution. He needs clean, pleasant surroundings, with touches of beauty. He must have access to all the education he can profit by, to all the food his body needs, to a useful career and to rewarding leisure pursuits.

These are necessary ingredients to the good life: All are currently restricted and in some areas seem to have ceased to exist. To ignore this challenge would be to take a tragic backward step when forward momentum is needed.

Fortunately, the people of the United States are becoming alert to these problems. The forces of ugliness have been engaged in a battle for beauty; we have challenged mediocrity and sloth in a quest for quality; we have resolved to wage war against disease and poverty.

Though the U.S. birth rate curve has showed some signs of flattening, even the moderately-high Bureau of the Census

Robert Smith—Black Star

Charles Moore—Black Star

estimates project a U.S. population in the year 2010 of more than double the 195 million people we have in 1965. If that projection proves out, our population will be "only" 400 million by 2010. Should the high projection of the Bureau of the Census prevail, the U.S. citizenry will by then number about 438 million.

Worldwide, the prospect is even more disquieting. It took all his accumulated time on earth for man to reach an estimated one quarter billion at the time of Christ. By 1830 that figure had quadrupled to 1 billion. Only 100 years later the 2 billion mark was passed and in the next 35 years we had reached 3 billion. Incredibly, the fourth billion will be with us by 1980 and by the year 2000, 6 billion persons may be contending for their place on earth.

The United States is far from being self-sufficient in raw materials. We are a net importer by a significant amount and our overseas dependence increases every year. As foreign populations turn more to manufacturing, we can be sure they will use their own supplies first, exporting to us only what they do not need. We cannot safely, then, take other than an international look.

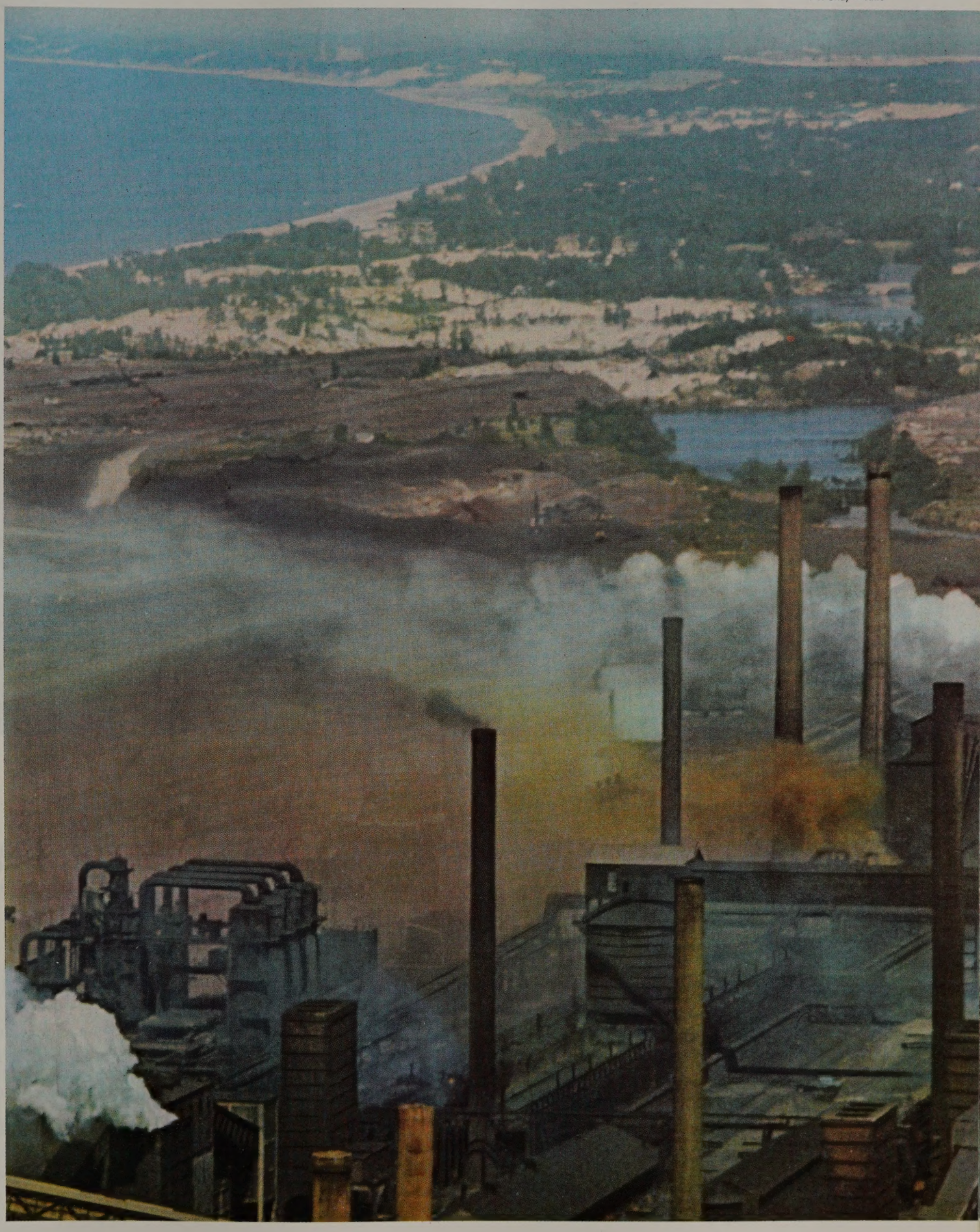
Each person must have elbow room and opportunity for occasional solitude. He must be spared excessive noise and pollution.

The reason for setting resource problems alongside the modern demographic situation is based on the schism in American attitudes toward population growth. Commodity dealers tend to see only the business impact of a larger market. Chambers of commerce and local officials still trumpet "growth." But others are impressed with the growing problems of stretching natural resources to meet our needs.

It seems increasingly apparent that fuel and energy needs will be met indefinitely by the development of new sources of power. But the quality of living—the maintenance of a livable environment—becomes less sure when we turn to the problems of pollution, the preservation of our out-of-doors, the provision of tolerable means to visit it, the achievement of style and beauty in our urban complexes.

The difficulties we face are not so much scientific and technological. Rather, they have largely to do with social

Art Shay—Time



Myron Wood—Time

Dan McCoy—Black Star

The maintenance of a livable environment becomes less sure . . .

philosophy and the will to organize for the general welfare. A wider and deeper dialogue on social purposes is necessary to break the moral, political, and economic bottlenecks to a better life for everyone. It is this Department's responsibility to contribute to this dialogue with reports to the people on its efforts to improve the outdoor environment, to protect our wildlife, to help eliminate litter and junk from the American landscape, to better manage our water, to stretch our fuels and minerals, and generally to maintain and strengthen our country's resource base.

It is high time to question the proposition that a continued indefinite increase in population is somehow good for us. Quite the opposite, that is the most blinding assumption we can make in our planning for the future.

The time has come when we must ask ourselves earnestly whether man, as part of nature, is subject to the laws that govern other species, particularly the law that for every species in a particular environment there is an optimum population.

Within the Department of the Interior, the Fish and Wildlife Service carefully studies the relationship of animals to their environment. Managed habitat for these wild creatures is based on this knowledge. When a species expands beyond the optimum indicated, its resources fail to go around—

Fairchild Aerial Survey

. . . when we turn to problems of pollution, the preservation of our out-of-doors, the provision of tolerable means to visit it . . .

individual members fail to achieve full growth—and finally, as living space becomes unbearably crowded, neurotic strains are set up and the individual's higher faculties atrophy.

The Department of the Interior also administers the National Park System. In many areas, the press of visitors is such that the essential nature of the park experience is threatened with drastic change.

It is time to ask some stern and searching questions in developing a "conservation in depth" philosophy:

What will happen to the quality of life if we come to the point where available natural areas of this continent can no longer sustain the hordes of trampling feet?

As population crowds in, will not the quality experience be sacrificed first?

At some future point down the road of "unchecked growth and progress," may not the amusement park type of outdoor experience be the only kind available?

As pressures of overcrowding bear down increasingly, will not the subtle diseases of over-civilization take their toll of mind and body?

"It may be," Secretary Udall has suggested, "that in the long run, over-population in this country will threaten the most important freedom we enjoy—the freedom each person

Dan McCoy—Black Star

Ice Skaters in New York's Central Park

. . . the achievement of style and beauty in our urban complexes.

Cherry Blossoms, Washington, D.C.

Fred Ward—Black Star

Kosti Ruohomaa—Black Star

Fred Ward—Black Star

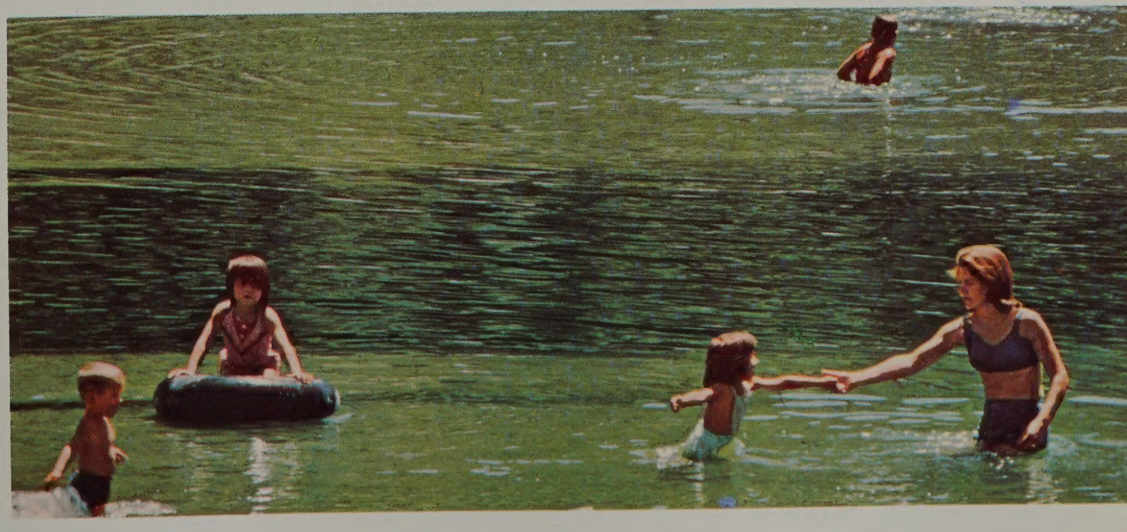
Seattle, Washington, from the Space Needle

must have to maintain his own integrity, to discover his natural self and to be true to it."

If we assume, as many do, that science can take care of our burgeoning needs indefinitely, then we must look also at the probable price tag and its effect on the people who will have to pay it. If we must wring the clouds for every drop of precipitation by applying rainmaking methods; if we must purify and reuse our water scores of times as it drops from the mountains to the sea; if we must harness heat and the atom to separate salt from water and build complicated aqueducts to deliver it where it is needed; if we must process ever lower and lower grade ores to recover the iron and copper and zinc to keep the wheels of industry and comfort rolling—what then will be the cost?

Will we any longer be able to boast of a margin for leisure and higher human development?

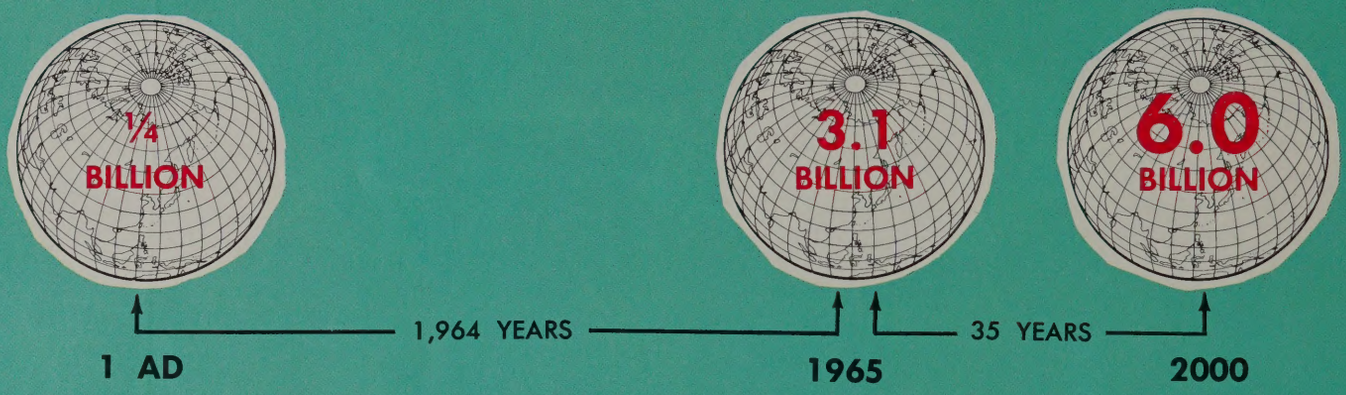
In the sections of this report which follow, these basic questions and the problems of relating an ever-increasing population to its environment will be explored—with particular attention to the natural resource responsibilities of the various bureaus and offices of the Department of the Interior.



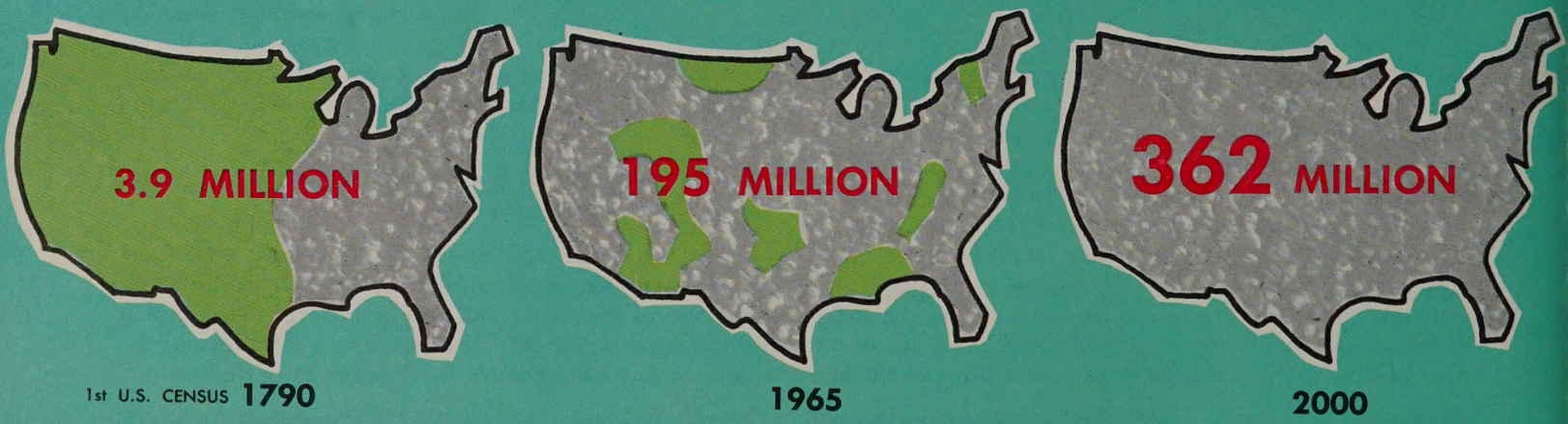
Our Expanding

. . . and how

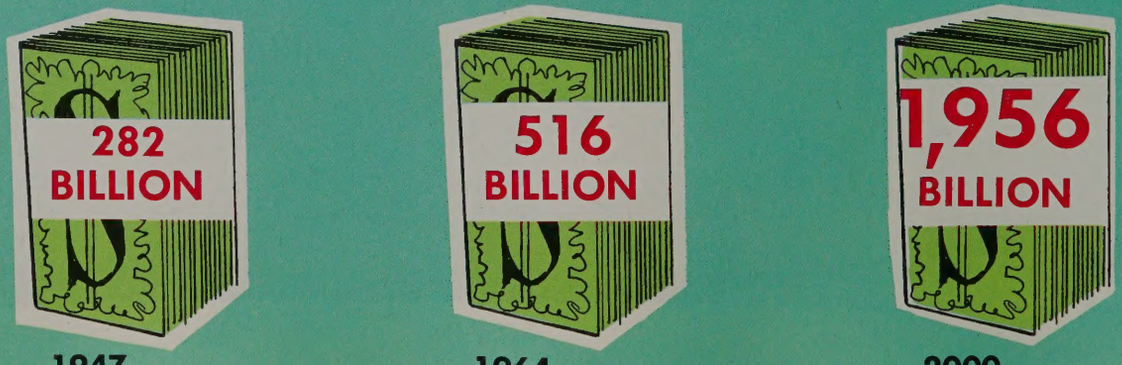
More people crowd our world each year . . .



. . . and our nation too . . .



. . . in the United States this expanding population will . . . earn and spend more money . . .

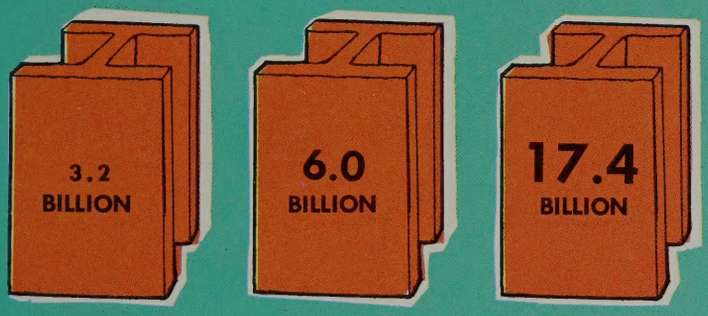


U.S. GROSS NATIONAL PRODUCT—IN BILLIONS OF 1954 DOLLARS

Population

it will affect our nation's vital natural resources.

. . . on products using minerals . . .



1947 1964 2000

IN BILLIONS OF 1954 DOLLARS
METALS AND NONMETALS ONLY

. . . and energy . . .

1947 1964 2000

IN QUADRILLION BTU's

. . . our nation's water will be used at a steadily increasing rate . . .

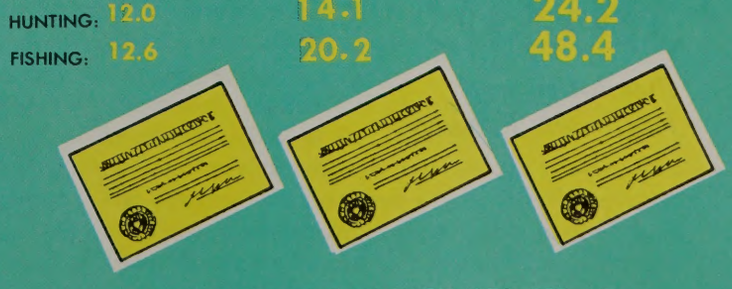
1900 1965 2000

IN BILLIONS OF GALLONS A DAY

. . . this same population will place greater demands on our National Parks and fish and wildlife resources.

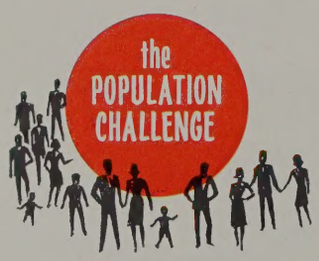
MILLIONS OF VISITS PER YEAR

1947 1965 2000



MILLIONS OF PAID LICENSES PER YEAR

1947 1964 2000



Population and Renewable Resources

Over and Over

"All the rivers run into the sea, yet the sea is not full; unto the place from whence the rivers come, thither they return again." Ecclesiastes 1:7

Pacific Seascape—Richard Beattie

The entire earth is our "resource." We live both on it, and off it.

Whether certain resources come under the heading of "renewable" or "nonrenewable" is often determined by the refinements and growth of technology.

Earth and water, if not too blatantly abused, can be made to produce again and again for the benefit of all mankind. The key is wise stewardship.

Once we fished the seas and streams without regard to the effect on fish populations; we milked our rivers of fresh water to slake our thirst, to irrigate our crops and to flush our wastes. We gave little or no thought to preserving the freshness, the life-giving properties of a healthy milieu for fish and fowl and plant life. We tore our food out of the soil with no idea that the earth might some day rebel in exhaustion.

Today we view both earth and water as "renewable" resources. Given thought and consideration and care, they can be made to serve man indefinitely—at least unless man by sheer weight of numbers overruns the boundaries of even that flexible term—renewable.

Among the resources which fall into the renewable category and are the responsibility of the Department of the Interior are water, public lands, commercial fisheries, and hydroelectric power. The agencies, bureaus, and offices directly involved include the Bureau of Reclamation, the Office of Saline Water, Office of Water Resources Research, Bureau of Land Manage-

ment, the Southeastern and Southwestern Power Administrations, Bonneville Power Administration, Bureau of Commercial Fisheries, Bureau of Mines, and Geological Survey. All are directly concerned with preserving, enhancing, or better understanding a renewable resource.

Of all the natural resources presently known to man, undoubtedly the most abused is water. So long as streams could cope with the load of wastes, we were content to let them struggle along. Suddenly, the load has become too much. Even our salt water estuaries and certain coastal ocean waters are being fouled. According to Jacques Cousteau, one of our oceanographic pioneers, they are beginning to back up and belch because of the mounting loads of effluvia they are required to digest. Anyone flying over Lake Erie can look down and see the cloudy mess of pollution which is killing much of the fish and plant life of that once sparkling-clear body of water. The scene is like looking at the flyleaf of a book on the end of civilization. If we are unable to turn our great material wealth into saving our great *natural* wealth, then our prospects are indeed grim.

Today, thoughtful people regard the situation as serious. We have developed an increasingly sophisticated way of life which calls for more and more of every resource to sustain it. By applying careful husbandry of our renewable land, water and power resources, we undoubtedly can make them stretch almost indefinitely. But without attention to the increasing burden that population pressures are exerting, the result will inevitably be the lessening of quality throughout our environment.

It is not a situation we can dismiss; the piper is waiting to be paid.

This section will sketch the programs of the Department of the Interior in dealing with renewable resources.

Water Resources Council

As the Northeast drought moved slowly from inconvenience to crisis to threatened disaster in the summer of 1965, one thing became increasingly apparent. It was not so much a shortage of water as a blind failure, years ago, to conserve and manage water.

In Los Angeles—which has only 15 inches of rainfall in a good year but whose water consumption is conscientiously metered—lawns were green, swimming pools were brimful, and air conditioners hummed. New York—in the midst of the worst drought on record—had twice that amount of precipitation, but reservoirs were at dangerously low levels.

On July 22, 1965, President Johnson signed into law the Water Resources Planning Act—a history-making piece of legislation designed to encourage conservation, development, and use of water and related land resources on a comprehensive and coordinated basis by the Federal Government, States, localities, and private enterprise.

It also established the Water Resources Council, composed of the Secretaries of Interior; Agriculture; Army; and Health, Education, and Welfare; and the Chairman of the Federal Power Commission. The President designated the Secretary of the Interior to chair the Council and then called on the Council for an immediate report of the Northeast drought situation with recommendations for alleviating it in all possible ways.

That report, which was quickly forthcoming, analyzed the current situation in the drought-stricken areas and made eight specific recommendations for Federal emergency action. Assuming still another year of drought, it also recommended strongly that long-run measures be planned and acted upon promptly.

Ironically, while the reservoirs were going dry, all the while the Hudson River flowed sluggishly through the heart of Manhattan, laden with sewage and industrial waste and totally incapable of slaking the mounting metropolitan thirst.

As the Northeast continued to wrestle with its water crisis, the Secretary of the Interior, at the President's request, led a

Secretary Udall and Philadelphia's Mayor James Tate on their way to a meeting of the Water Resources Council.

fact-finding mission to the larger cities in the hardest hit areas. He announced grimly that the Northeast was "walking on the edge of disaster," and termed New York City's water system "the leakiest in the country."

Office of Water Resources Research

The 88th Congress, on July 17, 1964, passed the Water Resources Research Act and on that same date an Office of Water Resources Research was established within the Department of the Interior. With a handful of personnel borrowed in part from other agencies, this group initiated its assigned research program.

The purpose of this act is to stimulate and sponsor programs

Ben Martin—Time

In 1965 New York City, surrounded by brackish water, is in its fourth year of draught.

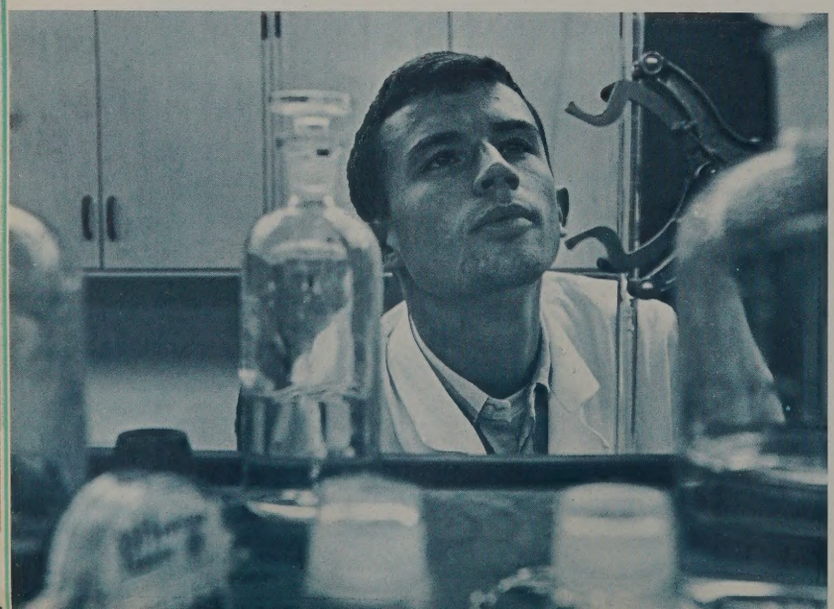
The Northeast was . . . "walking on the edge of disaster."

New York's Ashokan Reservoir—40% below its normal level

Will Blanche—Time

Water Resources research at Washington State University under Interior grant.

Photos by Jim Barker



of research and to promote the training of scientists capable of dealing with water problems. The program thus set in motion had, within 1 year, stimulated establishment of water resources research institutes in each of the 50 States and the Commonwealth of Puerto Rico.

Projects started the first year were aimed primarily at providing water information of the conventional types. But a few dealt with the use and management of water for outdoor recreation, fish and wildlife and other similar uses to which limited attention has been given.

Bureau of Reclamation

For six decades, the Bureau of Reclamation has been building multiple-purpose water projects which have turned wide, sterile stretches of desert and prairie in the 17 Western States into rich regions of fruitful farms and thriving communities. Today not only have more and more people been attracted to the West but the western concept of society has changed. Water must now be made to serve not a primarily agricultural society, but an industralizing society with mounting payrolls and increased leisure time.

When pioneers were settling the western wilderness they needed only simple stream diversion irrigation, supplemented by erratic rainfall. Domestic needs were met by water carried

Water resources research institutes were established in each of the fifty states and the Commonwealth of Puerto Rico.

in buckets from the spring or creek or hand-pumped from a hand-dug well. The first irrigation projects were built for the single purpose of supplying irrigation water. As people flocked into the area and congregated in towns, their needs changed. To meet these needs, the multiple-purpose concept of water resource development evolved. Today less than one-third of Reclamation's construction program relates primarily to irrigation. More than two-thirds is geared toward developing municipal and industrial water supplies, power generation, recreation, flood control, and other nonirrigation functions. However, irrigation is still the essential reason for, and benefit from, Reclamation, and it will continue so, especially as our food needs climb.

In the realm of water development we must capture ever-increasing amounts; we must track it down through its perpetual cycle—in rain clouds, in streams, in underground aquifers, all the way to the sea.

The volume of water on this earth today is the same as it was when the dinosaurs roamed. There is no more water; there is no new water. Man has simply learned to find, harness, transport, and reuse the same drops that glistened at the birth of the earth. He is still learning; he has a great deal more to learn.

During fiscal year 1965, the Bureau completed 10 dams having a combined reservoir capacity of 28 million acre-feet (over 9 trillion gallons) of water for multiple-purpose use. In addition, it completed irrigation facilities to serve 249,771 acres of land—including 331 miles of canals, pipelines, laterals, and drains. It installed 450,000 kilowatts of hydroelectric generating capacity and placed in service 1,400 miles of high-voltage transmission lines to carry power to customers.

At year's end the Bureau was constructing 18 dams with a total reservoir capacity of 7.4 million acre-feet (nearly 2.5 trillion gallons), 8 powerplants with a combined capacity of 1.8 million kilowatts, and 1,200 miles of high-voltage transmission lines. Reclamation investment in western water development facilities at the end of the year amounted to about $4.9 billion.

Work began on the earthfill Ruedi Dam, first principal feature of the Fryingpan-Arkansas Project in Colorado, destined to be one of the largest transmountain diversion developments in the Western United States. The dam plugs the Fryingpan River on the western slope of the Continental Divide and will store and release water to the Colorado River to replace water diverted through the Continental Divide from the western slopes into the Arkansas River on the eastern slope. The main water carrier will be a 5.3-mile-long tunnel through the Divide.

Work progressed on the San Luis unit of California's Central Valley Project. This first joint Federal-State project undertaken by the Bureau will convey irrigation water to more than half a million acres on the western and southern sections of the San Joaquin Valley, and by connecting with State facilities, will supplement southern California's coastal water supplies.

The largest water distribution repayment contract in the Bureau's history was signed in April 1965 with the Westlands Water District, to deliver San Luis Project water to 400,000 acres, mostly in Fresno County.

A new development in the Central Valley Project, initiated in 1965, is the $50 million, 122-mile long Tehama-Colusa Canal in north-central California.

To the east of California in the Rocky Mountain area, major advances were made on the Colorado River Storage Project to develop the land and water resources of the Upper Colorado Basin—a 110,500-square-mile area in Colorado, Utah, Wyoming, New Mexico, and Arizona. Construction continued on two dams on the Gunnison River in Colorado—Blue Mesa and Morrow Point.

On the far-flung Missouri River Basin Project, construction on Yellowtail Dam in Montana was 90 percent complete. This 525-foot-high structure will regulate flows of the Bighorn River for irrigation, flood control, power generation, and other uses.

The saving of human life cannot be measured in dollars, but a price tag can be put on prevention of property loss. Flood damages averted by Reclamation project structures during the 10-year period of 1955 through 1964 amounted roughly to $426 million. For many individual dams, value of damage prevented far exceeds the cost of construction. Some dams in the Northwest fully paid for themselves during fiscal year 1965 by cutting down the record-breaking flood destruction of that one year alone.

The value of river regulation by dams and reservoirs in flood times must be measured not only in terms of saving what might have been destroyed by uncontrolled waters, but in terms of retaining the water itself for future use. A deluge of water

that would have drowned a whole river valley in spring leaving death and destruction in its wake, can, if caught and stored behind a dam, save the same countryside from drought months or years later, as the stored surplus waters are released into distribution systems.

Since 1906 Reclamation irrigation water has helped to nurture a strong agriculture-based economy in the West. As the population grew and methods of transporting food improved, the market widened. Today specialty items from western irrigated lands are found on dinner plates from Maine to Hawaii, as well as on the tables of Europe and elsewhere outside the United States.

In 1964 Federal Reclamation projects provided full or supplemental irrigation water supply to 7.5 million acres in the 17 Western States, producing more than 150 different crops valued at $1.5 billion. A large share of this production was in fruits and vegetables and in forage crops fed to livestock to produce more meat to fill growing demands.

The aggregate value of crops produced on Federal Reclamation projects since 1906 now stands at $21.7 billion—a figure which represents only the irrigation benefits of the Reclamation program but which is roughly five times the entire Federal investment so far made.

An initial benefit of Reclamation activities is the employment its construction program provides. During the past 4 years as much as 100,000 man-years of work went into building the dams, powerplants, and other facilities and into furnishing the equipment and material used to build them.

Employment provided by a project does not cease when the physical facility is completed. At this point the more meaningful, long-term employment begins. Consider only one of the purposes of a Reclamation project—irrigation. It is axiomatic that bringing irrigation water to an area provides opportunities for farmers; but it has been found that for each of the more than half million jobs created on irrigated farms, two additional jobs are created in nearby communities.

Reclamation project farmers, nonfarm businessmen and workers in the vicinity of the projects pay an estimated $350 to $450 million a year in Federal income taxes stemming directly from project operations. Cumulative Federal taxes from this source since 1940 amount to more than $6 billion, more than the total Federal investment in all Reclamation facilities.

Around 90 percent of the Federal investment in the Reclamation program is repaid to the Government. Direct beneficiaries repay this money to the U.S. Treasury, usually over a 50-year period. Irrigation water users pay without interest some of the construction costs allotted to this purpose. Those which are beyond the irrigators' ability to meet are paid from power revenues after all costs alloted to power have been returned to the Treasury with interest. Municipal and industrial water costs are paid by the beneficiaries, also with interest.

Dust storm on parched western land

1965 Arkansas River flood, Kansas

As western urban communities grow they require ever greater amounts of water for domestic and industrial uses. In 1964 the equivalent of the entire population of the State of Wyoming was added to the number of consumers in this class of Reclamation water use.

A milestone of the fiscal year was award of the last major contract for the largest municipal and industrial water supply project ever undertaken by the Bureau of Reclamation—the Canadian River Project in Texas. Scheduled for completion in the summer of 1968, this development will furnish water to 11 cities and towns in the parched panhandle of the Lone Star State. Virtually finished is the 228-foot-high earthfill dam

behind which water will be stored and then transported by means of a 322-mile-long aqueduct.

Albuquerque, N. Mex., in need of domestic water, soon will receive a supply from the San Juan-Chama Project. An average of about 105,000 acre-feet (35 billion gallons) will be diverted from the tributaries of the San Juan River on the western slope of the Continental Divide, through the Azotea Tunnel, to the Rio Grande basin in New Mexico. There it will not only furnish municipal and industrial water to Albuquerque, but will provide irrigation water for about 120,000 acres of farmland in the Rio Grande basin.

Probably the Bureau's most important project in the proposal stage is the Lower Colorado River Basin Project, to serve an area at once the driest and the fastest-growing in the United States. With people pouring into the sun-drenched stretches of desert, mountain, and plains (3.5 million migrated from East to West in the 1950's), the ground-water level in the vicinity of such cities as Las Vegas, Phoenix, and the metropolitan complex along the southern California coast has gone down and down. In other words, that water is being mined much faster than nature can replenish it.

Legislation being considered by Congress would authorize the Central Arizona Unit, a long-planned system of conduits, canals, pumping plants, and storage facilities to provide Colorado River water to the Phoenix-Tucson area and, by exchange, to other areas in Arizona.

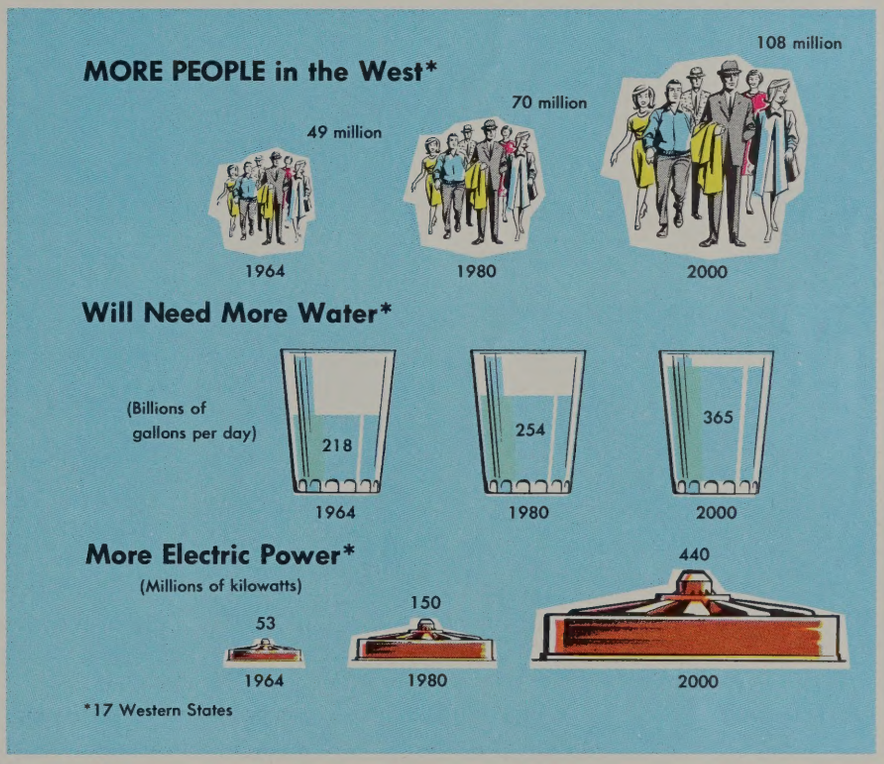
The Central Arizona unit plan guarantees California 4.4 million acre-feet of Colorado River water annually until such time as works are in operation to deliver at least 2.5 million acre-feet from sources outside the Colorado River Basin.

On the threshold of realization are two other Reclamation developments. They are the Auburn-Folsom South Unit of the Central Valley Project in California and the Garrison Diversion Unit of the Missouri River Basin Project in North Dakota. Both these projects were authorized in the final days of the first session of the 89th Congress.

Principal feature of Auburn-Folsom is the Folsom South Canal, which will divert water from the American River downstream from the Auburn and the Folsom dams. The 67-mile-long dual-purpose canal, curving through the rich east side of Central Valley down to Stockton, will bring water to irrigate nearly 400,000 acres. Water also will be delivered to municipalities for residential and industrial use.

The Garrison Diversion Unit in North Dakota will divert water from the Corps of Engineers' Garrison Dam on the main stem of the Missouri River to supply irrigation, municipal and industrial water, fish and wildlife enhancement, recreation development, and flood control to much of North Dakota. The completed irrigation system will include 1,865 miles of canals and laterals, 4 regulating reservoirs, 141 pumping plants, and extensive drainage facilities.

The saving of human life cannot be measured in dollars, but a price tag can be put on prevention of property loss.



The Garrison Unit is generally conceded to be important to economic development in North Dakota, which sacrificed over half a million acres of rich bottom farmland to the Garrison and Oahe Reservoirs on the Missouri River. The unit will act to stabilize the hitherto dry-farming agricultural economy of this Great Plains area. Dryland grain, a surplus crop, will be replaced by row crops and feed crops for livestock production.

As more people inhabit the world, ways must be found to increase the supply of resources. Nowhere is this more readily achieved than with water resource development. But the need to increase our already considerable accomplishments in this area continues to be pressing. To stretch our water supply, the Bureau of Reclamation carries on intensive

research. Its facilities at its Denver headquarters are among the most extensive of their kind in the world.

In 1956, the Office of Atmospheric Water Resources was established in Denver. Weather scientists there are seeking a way to cause precipitation from air masses transporting large quantities of water, so that the resulting runoff can be stored for use when needed. In 1965, nine contracts were awarded for research on the potentialities of induced precipitation. Aims of these contracts included development of beneficial weather modification procedures and techniques in the northern Great Plains area; inducing more snowfall in Wyoming's mountains to increase spring runoff, and development of cloud nucleation or seeding techniques in the vicinity of Flagstaff, Ariz., using dry ice and silver iodide to create ice crystals in test clouds.

One of the greatest advances toward increasing our store of water would be to reduce evaporation. It has been estimated that some 14 million acre-feet (about 4.6 trillion gallons)

Diversion tunnel, Glen Canyon Dam

are lost by evaporation each year from lakes and reservoirs in the 17 Reclamation States. Bureau research is directed toward cutting this loss. One possibility is through applying 1-molecule-thick chemical films to large water surfaces.

Another western water thief is the group of plants known as phreatophytes. This stream-bank vegetation sucks up more than 24 million acre-feet (8 trillion gallons) of water a year and transpires it into the air. The search is on for chemicals to control such vegetation.

Bureau efforts to expand our resources are aimed primarily, of course, at benefiting the population of the United States. But the problems of inadequate natural resources are worldwide, and they are more acute in most other countries than in ours. Millions of human beings go all through life hungry. Although there is a steady increase in total food production over the globe, it lags behind the increase in people. Much remains to be done if the world's population is to have an adequate diet.

With our food surpluses we have helped to alleviate some of the world's hunger but that is all we can claim. Transportation and distribution problems alone would defeat any attempt to eliminate the world's food deficit by export of our surpluses.

However, in line with U.S. policy to find new ways of alleviating this world hunger, the Bureau is trying to help peoples of underdeveloped areas to increase their own food production. One of the basic needs is irrigation of cropland. Another is domestic and industrial water supplies. A great need also exists for hydroelectric power.

The Bureau's Foreign Activities Division provides aid in two ways: It sends teams abroad to help plan development projects and it provides technical training in this country for professional observers from underdeveloped countries.

The Agency for International Development frequently calls for these services. Similar requests come from the United Nations and other public and private organizations in this and foreign countries. Cost of such programs is paid by the foreign governments or by the requesting agencies.

During fiscal year 1965 more than 150 foreign engineers participated in training programs here; Bureau engineers worked as advisors in 11 countries.

Office of Saline Water

President Johnson in October of 1964 called the First International Symposium on Water Desalination at which representatives from 65 countries on 5 continents heard about 100 scientific papers on desalting brackish and sea water.

The Symposium, sponsored by the Department of the Interior in cooperation with the Department of State, marked the first extensive exchange of information from experts all over the world.

Interest in the program of the Office of Saline Water (OSW) began to accelerate in the summer of 1964 when the President directed the Department of the Interior and the Atomic Energy Commission to formulate an "aggressive and imaginative" program to step up progress in desalting technology. This program was drawn up promptly and submitted to the White House near the end of September 1964. By the year's end, implementation was underway and contracts had been awarded for a number of conceptual design studies of a large-scale plant.

Almost at the same time, Interior, the Atomic Energy Commission (AEC), and the Metropolitan Water District of Southern California signed an agreement to study the feasibility of a dual-purpose electric power and desalting plant capable of producing up to 150 million gallons of fresh water daily. Such a plant would be nearly 50 times larger than today's largest existing conversion plant—located on the Caribbean island of Aruba, a Netherlands' possession.

To carry out the level of effort called for by the stepped-up program, the Office of Saline Water was reorganized. In previous years, objectives were to stimulate interest and

710 foot high Glen Canyon Dam in Arizona

disseminate information, study the relative economic potentials of available processes, and explore the possibilities of developing new methods.

In the past year, research reached a point where it was necessary to re-cast the program by placing primary emphasis on engineering. The purpose of this was to develop the pumps, valves, tubing, and other specialized components that required modification or special design to function properly as parts of desalting plants. Many of the operating difficulties encountered have been traced to plant components that need to be redesigned to provide required characteristics and performance.

Staff and administrative services were reorganized to conform more precisely with definite functional responsibilities. A program analysis unit was established to look at overall requirements, determine where desalting plants can solve or alleviate a water supply problem, and review the overall economics of water. Steps were taken to set up an advisory group of engineering experts to augment available engineering competency.

Norman Matheny, Christian Science Monitor

Ambassador Ribeiro, of Ghana and Secretary Udall sample desalted salt water

Meanwhile, OSW continued to operate, to test and to improve its three demonstration plants—a 1 million gallon-per-day long-tube vertical distillation plant at Freeport, Tex.; a 1 million gallon-per-day vapor compression distillation plant at Roswell, N. Mex., and a 250,000 gallon-per-day electrodialysis plant at Webster, S. Dak. OSW also maintains a research and development test station at Wrightsville Beach, N.C., for pilot plant work.

Another major accomplishment during the year was acceleration in development of the promising reverse osmosis process. Early membranes had a water flux of 0.2 gallon per square foot of membrane per day. Membranes available today have water fluxes as high as 23 gallons per square foot of membrane per day. A 1,000 gallon-per-day pilot plant has been operated successfully on seawater and plans are being made for consideration of a 50,000 gallon-per-day unit.

As a result of an agreement between Prime Minister Eshkol of Israel and President Johnson, a United States-Israel desalting and power team undertook a preliminary feasibility study of a combination electric power and desalting installation for Israel. On recommendation of the joint team, the OSW and AEC are cooperating with Israel to finance a detailed engineering feasibility study of a plant that would produce 120 million gallons of fresh water daily in combination with an electric power plant.

The exchange of information between the United States and other nations was highlighted in 1964 by a visit of a U.S. technical team to the Soviet Union and a similar visit to this country by a Russian group. While the U.S. group was in Moscow during November, the two nations signed a formal agreement calling for a continued exchange of information during the next 2 years.

At the request of the Saudi Arabia government, the Department of the Interior organized a special team which conducted a preliminary appraisal of a proposed combination sea water desalting and electric power plant for Jidda. U.S. desalting experts also discussed use of conversion plans with officials in Egypt and Tunisia. These are examples of the international cooperation that has taken place in the past year and which points to still more.

The Geological Survey

The Geological Survey (Water Resources Division) has been collecting facts on the flow of streams, water level fluctuations, and the quality of surface and ground waters for 85 years. It is that systematic and continuous recording of water facts that provides the basis for water resources development planning and water management.

Through the National Water Resources Data Network—maintained in cooperation with State and local agencies and other Federal agencies—the Survey now collects water resource data at more than 10,000 places in the United States. This network contains stream-gauging stations, water-quality stations, and ground-water observation wells. The data are released each year for public use in the form of tens of thousands of pages of reports.

Intensive study is being given to the relationship of ground- and surface-water resources, their development and management. Area investigations in progress throughout the Nation are concerned with ground-water pumping that seriously lowers ground-water levels, induces movement of saline water into fresh water aquifers (natural underground reservoirs), reduces the base flow of streams, and otherwise imposes changes in the recharge-discharge relationship.

In response to widespread public concern with water pollution by acid mine drainage, the Water Resources Division is working to identify the sources, causes, and means of controlling these wastes.

Studies now in progress to supplement the manageable water supply of the Nation, include:

(1) Basic studies of ice wastage, accumulation, and meltwater of South Cascade Glacier, in the State of Washington.

(2) Studies on reducing water losses by evaporation. A specially designed wind tunnel tested the effectiveness of covering the water surface with single-molecular films.

(3) A study of trees bordering the Potomac River near Washington, D.C., to find out if the form and age of trees can provide details about past floods and droughts, even where no previous stream data and flood information are available.

(4) A 19-volume report on regional flood magnitude-frequency studies based on river discharge records of the National Water-Resources Data Network.

(5) Continuing studies of flow characteristics using harmless red "tracer" dyes in major rivers.

Ground water resources often are a cheap and abundant source of supply. Intelligent exploitation, however, depends on knowledge of patterns and rates of ground-water movement. Water Resources Division research in this area during fiscal year 1965 included:

(1) A method for calculating rates of ground water movement through the confining beds between water-bearing formations.

(2) Calculation by means of carbon–14 concentrations in ground water samples of the rate of ground water movement in limestone aquifers in Florida.

(3) Study of the aquifer system under the Atlantic Coastal Plain, one of the largest potential ground water sources in the United States. Presently it is discharging vast quantities of fresh water to the sea. Studies underway may result in methods for capturing this water.

(4) Publication of two preliminary maps showing mineralized ground water resources of mainland United States. Conversion of such water to fresh water offers supplemental water potential in many parts of the country.

Significant accomplishments of the Water Resources Division during fiscal year 1965 pertained to chemical investigations of water quality and pollution problems. These included:

(1) Research and operational activities concerning pollution from pesticides and herbicides, emphasizing detection of these pollutants and their movement through the hydrologic environment.

(2) Research on the biological and chemical factors that influence the overall quality of lake waters, with particular attention to the factors influencing growth of toxic algae in reservoirs.

(3) Studies on Long Island, N.Y., on the problems of a dwindling supply of usable ground water and increasing salt water encroachment.

(4) Intensive hydrologic studies in the Everglades National Park to determine the effects of man-made changes in its water regimen.

(5) A study of density stratification in the Brazos River Basin, Texas, to aid in management of water supplies.

(6) Two projects in the Trinity River Basin of California, one involving changes in the sediment transport capacity that will result from diversion to the Sacramento River basin, the second concerned with the quality of water used for fish culturing.

(7) Studies of the influence of industrial and municipal waste on estuarine and off-shore water quality in the Duwamish River and Puget Sound, Washington.

During fiscal year 1965, through the auspices of the Agency for International Development and the United Nations, 30 Geological Survey hydrologists worked overseas with 14 host governments. Training in the United States was given to 35 foreign specialists from 14 nations.

Water information, in the form of publications and replies to requests, is being made available at a rapidly increasing rate. The Water Resources Division has established an Office of Water Data Coordination, which collects, catalogs, and coordinates water data from the various Federal agencies.

The Conservation Division of the Survey classifies the mineral and water resources on Federal lands, and supervises the development of leasable minerals to assure maximum economic recovery and restoration of land values after operations are completed.

Hydroelectric Power

Gravity, which is taken for granted even more so than air and water and soil, also has some claim to the title "resource."

Archie Lieberman—Black Star

Power lines framed by a Western sunset

For just as soil and water can be used to produce food, so gravity and water can be used to produce power.

It is seldom anymore that we spill "water over the dam." Instead, we impound it and use it to generate massive amounts of power—a use which neither consumes nor pollutes the water.

The Department of the Interior contains four power marketing agencies—Bonneville Power Administration, Southeastern and Southwestern Power Administrations, and the Bureau of Reclamation. These agencies, together, sell almost all the federally-produced power except that produced and marketed by the Tennessee Valley Authority.

Power is sold to many types of users and distributors, including privately-owned utility companies and large industries, but by law, sales preference is given to public bodies and cooperatives.

Interior marketing agencies directly serve the power needs of 665 preferred customers in almost every part of the Nation. Direct savings in electric rates that have accrued to these pre-

As the West's population increases, the demand for power, efficiency, and economy decree the interconnection of different transmission systems.

ferred customers aggregate many millions of dollars. Preferred customers of the Southeastern Power Administration, youngest of the marketing agencies, already have saved almost $10 million in power costs.

The impact of public and rural electric cooperative power programs, including the Federal program, consists only in part of direct benefits to customers. A more widespread benefit is the "yardstick" effect of public and cooperative rates, against which rates and services of the entire power industry can be measured. The result is beneficial to every electric customer, whether of public or private power.

All multipurpose project costs directly related to power production and an appropriate share of joint costs, with interest, will be fully repaid from power revenues.

Important as are the benefits of these projects, special care is exercised to protect recreational and related values which may outweigh other purely economic values.

Bureau of Reclamation

One of the major contributions of the Bureau of Reclamation has been supplying electric energy to light homes in the West and turn the wheels of the industries established there. The concept of power production as a corollary of Reclamation projects was recognized early by Congress, which in 1906 authorized the incorporation of hydroelectric power facilities in the Federal Reclamation program. None of the water stored behind the dams had to be sacrificed, for on its way to its primary use, such as irrigation, it was simply run through turbines which turned the generators to produce electric energy.

As the West's population increases and, with it, the demand for power, efficiency and economy decree the interconnection of different transmission systems, so that electricity, frequently generated far from industrial centers, may be dispatched directly to the areas where it is needed.

During the past fiscal year the Colorado River Storage Project transmission grid tied together a huge network of public and private power transmission systems, connecting 40 million kilowatts of generating capacity in the Western States. Also in fiscal 1965, the first four generating units at the powerplant at Glen Canyon Dam on the Colorado River in Arizona were installed.

Work progressed on a line which will tie in the regionwide transmission grid of the Colorado River Storage Project with the Missouri River Basin Project. This key line will interconnect Federal power facilities in a 15-State area of Western United States, and will provide a north-south link in a high-voltage transmission network extending from Montana and North Dakota to Arizona, a distance of 1,250 miles.

The most important achievement in the history of electric power system development in the United States is the Pacific Northwest-Southwest Intertie, which will join electric systems—public and private—extending from Seattle to Los Angeles and Phoenix. When President Johnson approved the project he said he considered it "the launching of a new era of cooperation between private and public power in the United

States—both working in partnership and supplementing each other to provide power for the consumers efficiently and economically."

Four transmission lines reaching from the Federal powerplants on the Columbia River in Washington and Oregon to terminals in California and Arizona will comprise the backbone of this epoch-marking intertie. Two of these will be high-voltage, direct-current lines, America's first and the world's longest.

Delivering electric power to users in 11 Western States, the Intertie not only will permit surplus Northwest secondary power (power available only during part of the year) to be sold in California and the Southwest, but also will make possible exchanges of Northwest summertime surplus peaking capacity for Southwest wintertime surplus peaking capacity, with resultant substantial savings for both regions in powerplant investment.

The increased transmission capacity to be available in the Intertie, coupled with the improved streamflow regulation which will result from construction of dams on the Canadian stretch of the Columbia River under the recently signed Columbia River Treaty, makes additional generation of hydropower at Grand Coulee Dam not only desirable, but mandatory. The plans of the Bureau of Reclamation for a third powerplant there encompass installation of 12 new 300,000-kilowatt generators, which will nearly treble the present capacity of the generators in service at Grand Coulee and will make that hydropower facility among the largest in the world.

The most important achievement in the history of electric power development in the United States is the Pacific Northwest—Southwest Intertie, which will join electric systems, public and private, from Seattle to Los Angeles and Phoenix.

Southeastern and Southwestern Power Administrations

The regions served by the Southeastern Power Administration (SEPA) and the Southwestern Power Administration (SWPA) have increased rapidly in population and even more rapidly in industrialization.

Keeping pace with the dramatic growth of the 6 States in its marketing area, SWPA's power availability has increased to more than 18 times its initial capacity of 70,000 kilowatts in 1943. It now has marketing authority for 21 projects, 13 of which were in complete or partial commercial operation in July 1965. Total nameplate hydroelectric capability of these 13 projects is 1,303,000 kilowatts. In June 1972, when the last of the eight additional projects now under construction is completed, SWPA's marketing capability will total 2,003,500 kilowatts.

Almost 50 percent of the nearly three-quarters of a billion dollars total cost of the 13 Federal projects from which SWPA is marketing power will be repaid through sale of power.

SWPA's marketing area encompasses all or parts of Oklahoma, Arkansas, Missouri, Kansas, Texas, and Louisiana and includes the great rivers of the Arkansas, White, and Red basins.

The water resources of the river basins in the SEPA area (Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, and Kentucky) are among the most abundant of any region in the country. The rivers—the Cumberland, Kanawha, Roanoke, Savannah, Appalachicola, and Alabama—have a tributary area with an annual rainfall exceeded only by the North Pacific coast.

SEPA's power marketing capacity has increased to more than 12 times what it had when it was established in 1950.

Pacific Northwest—Southwest Intertie

It then had 140,000 kilowatts. Now SEPA has marketing responsibility for 19 projects under construction or in operation, 13 of which were in complete or partial commercial operation in July 1965. Their total capacity is 1,677,000 kilowatts. When the last of the six additional projects now under construction is completed, in fiscal year 1971, SEPA's hydropower supply will total 2,310,000 kilowatts.

Power sales will repay more than 70 percent of the total cost of nearly three-quarters of a billion dollars of the 13 Federal projects from which SEPA is currently marketing energy.

The new high voltage interconnection between SWPA and the Bureau of Reclamation is the first such ever effected between Federal power transmission systems.

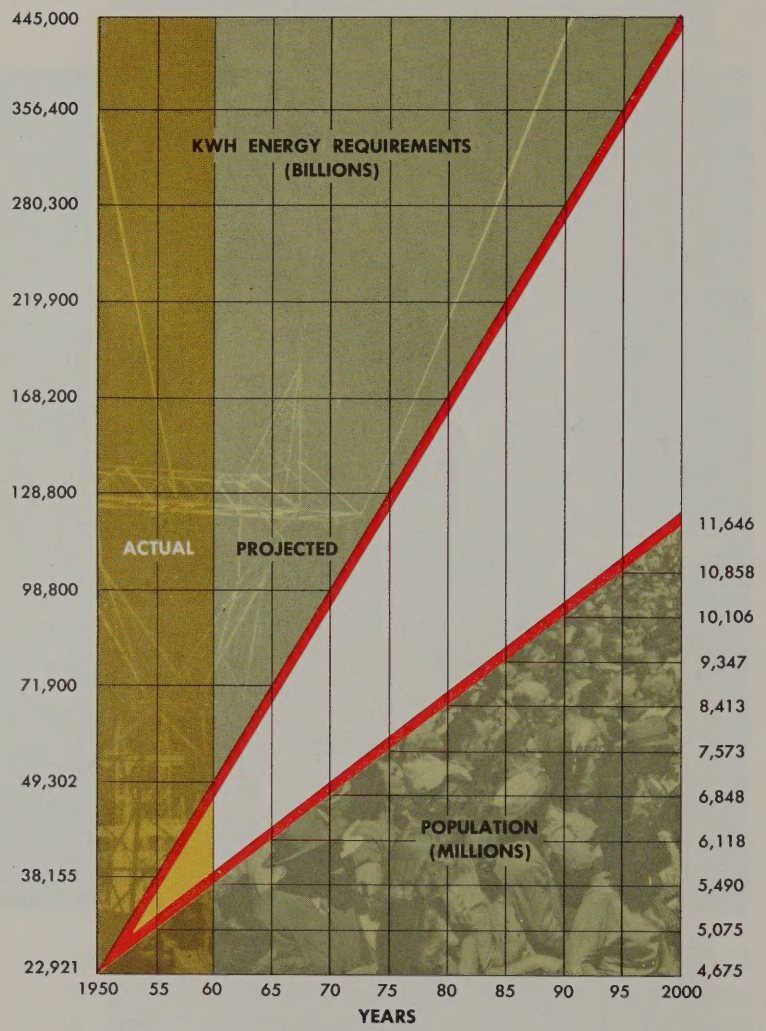
Completion of the hydroelectric facilities associated with the Arkansas River Navigation Project will pose new prob-

lems for SWPA. These facilities are run-of-the-river plants; they must generate power when water is available, which is not necessarily when it is most needed. Evaluations of the best way to use this power include (1) pumped storage facilities to convert off-peak energy into peaking energy; (2) extra high voltage transmission to export the energy to distant areas that can better use it, and (3) pooling of local thermal power facilities to more completely integrate all power sources of the area.

SWPA also is studying the best means of marketing from two proposed pumped storage plants on the Arkansas River with a capacity of 1 million kilowatts. Water will be pumped into storage reservoirs at higher elevations, then released to generate electricity at peak load hours. Normally, the turbine pumps that lift the water can be reversed to drive generators as the water falls again.

In the SEPA area studies also are underway to correlate projected facilities with the area load and the market to be served. In both areas, pumped storage facilities are viewed as wise investments to harness fully the rivers' power, for the benefit of all the human needs of the valleys—and the Nation.

PACIFIC NORTHWEST POPULATION GROWTH & ENERGY REQUIREMENTS



Bonneville Power Administration

The Bonneville Power Administration (BPA) was created by Congress in 1937 to market power from Bonneville Dam on the Columbia River. Later it became the marketing agent for Grand Coulee Dam and all the Northwest Federal dams that have followed. Now 21 Federal projects in the region produce power; 7 more are under construction. The dams are built and operated by the Corps of Engineers, Department of the Army, and the Bureau of Reclamation.

BPA sells electric power on a wholesale basis, delivering it to 145 public and private utilities and large electroprocess industries. The BPA transmission system has become the main grid for the Northwest and one of the world's largest networks of high-voltage lines. From its headquarters in Portland, Oreg., BPA schedules and dispatches power from the 21 dams, which have a generating capacity of 6.7 million kilowatts. BPA also wheels and exchanges more than 4 million kilowatts for non-Federal utilities.

By 1975 the population of the Pacific Northwest is expected to number about 7 million—or 1.5 million more than it did in 1965. This future populace will also consume greater amounts of electric power per person. Average residential use now is 11,000 kilowatt-hours a year. Within 10 years this figure will rise to about 16,000 kilowatt-hours. Conservative estimates are that electric energy loads in the region will nearly double in the next decade.

To meet future loads, BPA is adding to its transmission capacity. A new 500,000-volt grid will overlay its 230,000-volt and 345,000-volt grid. The first 879 miles are under construction and Congress has authorized another 207 miles. By 1975 BPA will require 1,600 miles of 500,000-volt transmission lines, exclusive of the Pacific Northwest-Pacific Southwest Intertie.

A large part of the new generation will be installed at existing projects, both Federal and non-Federal. Dams have now been built on all the most economical sites in the river basins, but at many of these dams additional generators may be installed.

Congress has been asked to authorize a third powerhouse at Grand Coulee Dam, adding 3.6 million kilowatts of capacity. This, with the capacity of the two existing powerhouses, would boost Grand Coulee's total to about 5.6 million kilowatts—more than is now being installed at any dam in the world.

There is space at Bonneville Dam for a second powerhouse with 6 units generating 360,000 kilowatts; 11 empty slots await generators at Chief Joseph Dam, which will add 704,000 kilowatts; 8 more generators with a 624,000 kilowatt capacity may be added at The Dalles Dam; 16 generators are scheduled for John Day Dam, with 4 more to be added later. And this is only part of the plan for expansion.

In order to assure Bonneville's ability to maintain its schedule to repay the Federal investment in Northwest power facilities, the Secretary of the Interior, on September 3, 1965,

approved a proposed BPA rate increase—the first in Bonneville's 28-year history. The increase, averaging about 3 percent, would become effective December 20, 1965, and would increase BPA revenues by about $4 million over the next 9 years. Even with the increase, however, BPA's wholesale power rates will remain the lowest in the Nation.

With the heavily increased power needs, the preemption of land for substations and transmission lines has increased. Substations covering scores of acres will be needed in heavily populated areas. Travelers will be treated to the sight of additional lines of steel transmission towers marching across highways and over the horizon. BPA engineers, who are accustomed to wrestling with engineering problems, have taken on an additional assignment—the problem of aesthetics.

Each new line and each new substation is a thing of beauty to the engineers who build them. But the average American scarely notices the geometrical order of a substation—the switches, transformers, circuit breakers, capacitors, all fitted together in a precise pattern. To the general public, a substation with its galvanized towers and squat control house often seems ugly.

This problem of aesthetics has prompted a review of all Bonneville facilities. Substations are being screened and landscaped. Larger transmission lines are being built to hold to a minimum the land needed for right-of-way. In this way, the Bonneville Power Administration is responding not just to the old and increasing need for power, but to a new and challenging need to keep our land beautiful while serving its people.

Bureau of Commercial Fisheries

The commercial fisheries of the United States, in 1964 provided a 4.5-billion-pound catch of commercial fish and shellfish. While this amount is appreciably the same as it was in 1945, the fact is that commercial fishing is currently engaged in a struggle for survival.

The degree of trouble varies within the industry, but a number of factors in the overall problem can be readily identified. They include increasing costs of operation, restricted supplies of fish within the range of obsolete vessels, lack of investment capital available to the industry, and increased competition in the world marketplace.

Fishery Research takes on a new dimension with the use of this balloon for locating schools of fish.

While other nations have forged ahead with construction of large vessels of modern design, equipped with new gear and labor-saving devices, the U.S. industry has, for the most part, stood still. This is particularly true in the high seas trawl fisheries. With Russian and Japanese modern stern trawlers operating rings around them, the American fleet has only one such boat, and it was not put into service until 1964.

In recent years the Russians have entered the fisheries off our east coast with a whole fleet of modern stern trawlers and a large fleet of drift gill net boats accompanied by motherships.

The numerous vessels of these two fleets may be depleting stocks in some areas.

Another cause of commercial fisheries concern is the extent to which the Russians have entered the king crab fishery along the coast of western Alaska. There also is reason to believe that Japanese high seas fishing operations in the northern Pacific are taking as many as one-third of the Bristol Bay red salmon formerly caught by U.S. fishermen.

Young men are not being attracted to take up commercial fishing as a profession, and as a consequence the average age of U.S. fishermen is advancing rapidly. The industry, as now constituted, shows reluctance to adjust to changing conditions. In addition, restrictive and contradictory legislation on the part of many States is inhibiting the industry's growth.

Another matter of extreme concern is pollution. Reversal of pollution damage to our fisheries resources will require a complete overhaul in traditional thought. Too long have we regarded our rivers, estuaries, and bays as convenient, safe places for disposal of all the varied refuse of civilization. Convenient it may be, but the social costs are now becoming evident.

Pollution has ruined many acres of formerly productive oyster and clam beds. The upper bays and estuaries close to major urban and industrial complexes have in many cases become almost biological deserts. Perhaps worse, other areas still produce shellfish which may have become so contaminated as to be unfit for human consumption.

In one way or another almost any type of pollution affects important commercial fish species. Raw or even treated sewage may reduce dissolved oxygen or cause tremendous increases in the number of undesirable plankton organisms. Pesticides and herbicides in extremely minute quantities can destroy or alter normal physiological functions of fish and shellfish and of the microscopic plankton which is their primary source of food. Radioactive refuse cannot only change normal life processes but also may have genetic effects.

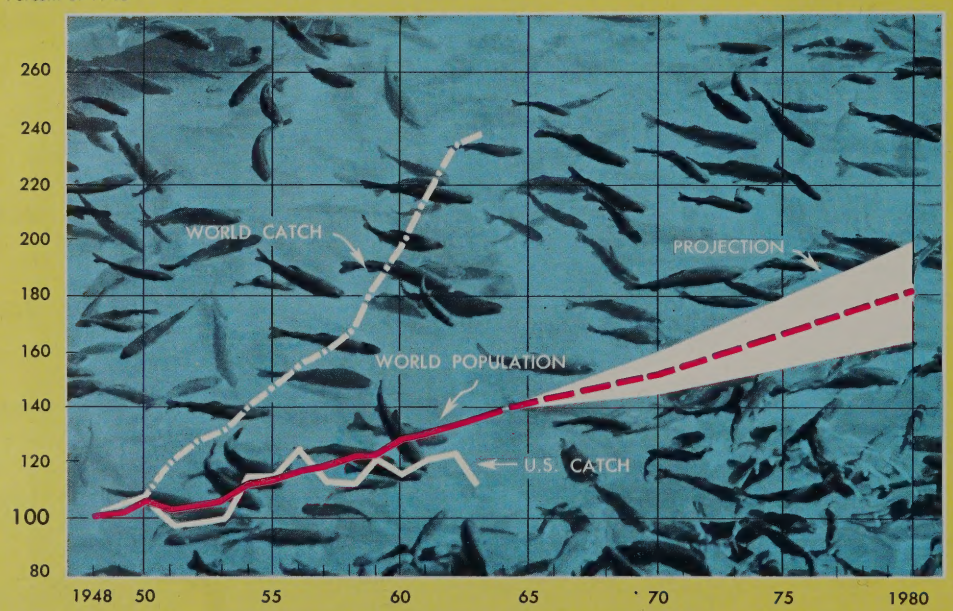
Other activities of man also can have an adverse effect on aquatic life. Dam construction, harbor and channel dredging, salt marsh draining and filling, bulkheading and diking, for example, can modify environment to the point of actually exterminating fish and shellfish.

Estuaries, threatened in so many ways, are among the more important geographical areas in the United States. In this transition zone between land and sea, 7 of our 10 most valuable commercial fish species must spend a portion of their life cycle. Yet construction of homes in estuarine areas continues to accelerate.

Several fisheries are shared with fishermen from other countries, and if conservation is to be practiced then cooperation with these other countries is mandatory. The United States and Canada have agreements on the management of fisheries in the Great Lakes, the salmon fisheries of the Fraser River, and the halibut fishery of the northeastern Pacific. Conservation problems also are present in connection with several species in the north Atlantic, with the high seas fisheries for salmon in the north Pacific, tuna in the eastern Pacific, and whales in several oceans. Each of these problems requires that several or many nations enter into treaty arrangements that will conserve a fishery resource.

Other marine resources, virtually untapped, could yield a vast supply of high quality protein and utilize large quantities of labor and capital. World fish production and consumption have doubled during each of the past two decades. Yet marine experts believe that about 90 to 95 percent of the

CHANGES IN U.S. FISH CATCH RELATIVE TO WORLD CATCH AND POPULATION



Fred Kraft

ocean's productivity presently is unused and that utilization can be increased at least tenfold without endangering aquatic stocks. If so, under sound conservation management the world's oceans could produce at least 500 million tons of fish and seafood products annually, as opposed to 50 million tons today.

Although the total domestic catch has remained practically the same since 1945, the quantity of high valued food fish has declined significantly—from 3.17 billion pounds in 1945 to 2.46 billion pounds in 1964. Catch for industrial uses has increased from 1.43 to 2.06 billion pounds.

Annual per capita consumption of commercially caught fish and shellfish in the United States has averaged 10 to 11 pounds since World War II. With the rising population, this means a larger amount of fish consumed. But the increase is not provided by our own fisheries. It has come through imports.

World fish production and consumption have doubled during each of the past two decades. Yet marine experts believe that 90 to 95 percent of the ocean's productivity is unused.

Fred Kraft

These have increased from 0.40 billion pounds in 1945 to 1.16 billion pounds in 1963. Imports now represent 64 percent of our fish consumption and an annual outflow of $525 million.

With the aim of helping U.S. commercial fishermen cope with their problems, the Bureau of Commercial Fisheries (BCF) has been accumulating basic knowledge for a better understanding of the ocean and its resources. The National Ocean Engineering Program is ready now to translate this knowledge into a program for more efficient harvesting of ocean resources. Concurrently, fish products must be made more attractive to the consumer and distribution practices must be improved. Such objectives require study and effort. The Bureau is working on both.

Because our potential harvest from the seas is much greater than from the limited fresh water areas and because our knowledge of the seas is so small, the Bureau has begun an intensive study of the seas. Modern oceanographic vessels operate from the Bureau's biological laboratories at Woods Hole, Mass.; Washington, D.C., La Jolla, Calif.; and Honolulu, Hawaii. A new oceanographic laboratory soon will be completed in Miami, Fla.

Search for unexploited stocks of food fish and shellfish in quantities that would make commercial operations feasible have turned up new concentrations of sablefish, ocean perch, clams, brown shrimp, chubs, swordfish, and tuna.

Bureau efforts to develop new gear and to improve use of present gear have been successful. A new midwater trawl captures formerly underutilized species in commercial quantities. Improvements on the shrimp trawl hold promise of making daytime shrimp trawling profitable.

The midwater trawl could mean billion-pound landings for hake from waters off Oregon and Washington. Initial tests show that hake contains 15 percent protein of high nutritional value, equal to that of cod, salmon, and beefsteak. Large volumes of hake may be turned into fish meal, a source of high-grade protein for poultry feeds.

The BCF is working to develop an inexpensive product—fish protein concentrate (FPC)—a tasteless, odorless, light-colored powder that can be used in breads, cereals, and soups. A few ounces provides the necessary nutritive supplement in otherwise animal-protein-deficient diets. Its daily cost would be far less than that of other animal protein.

Three programs are being used to help modernize and improve the efficiency of the U.S. commercial fleet. The Fisheries Loan Program provides long-term financing to owners of fishing vessels. The United States Fishing Fleet Improvement Act, which became law in August 1964, provides for fishing

vessel construction subsidy equal to the difference between the cost of construction in a foreign shipyard and in a U.S. shipyard. The Fishing Vessel Mortgage Insurance Program insures mortgages for construction, reconstruction, or reconditioning of fishing vessels.

Bureau of Land Management

In the face of inevitable short-term rapid population growth, it is good to know that America still has lands barely used. These are the public lands—remainder of the original public domain still in Federal ownership, managed by Interior's Bureau of Land Management (BLM). Comprising 170 million acres in 11 Western States and 290 million acres in Alaska, they represent one-fifth of the land area of the United States.

For 30 years there had been no major legislation to direct the course of public land affairs. Then Congress, in 1964, passed three acts:

(1) *Public Land Law Review Commission Act.* This Commission will study all our public land laws and policies during the next 4 years with an eye to future needs. Meanwhile, BLM's management policies will be governed largely by the other two acts:

(2) *Public Sale Act.* This legislation makes it possible to sell public lands for modern needs such as community development and industrial uses.

(3) *Classification and Multiple Use Act.* This act recognizes for the first time that some of the public domain should be kept in Federal ownership and managed for various uses. It directs BLM to classify lands into two broad categories—those which should be transferred to other ownership and those which should remain in Federal ownership and placed under multiple-use management.

BLM continues to search for better ways to save and use more of the rain and snow that falls on the public lands. A Nevada research project, now 4 years old, is being conducted in cooperation with the Geological Survey, the University of Nevada, and the Weather Bureau. The study will help range managers locate the best sites for reservoirs, detention dams, livestock watering places, and other water control and storage structures.

Special "crash programs" are planned to benefit some 6 million acres of lands which are particularly subject to water and wind erosion. Much of this acreage has been grazed beyond its very limited capacity.

Timber and grass suffer most perhaps from fire. To combat fire losses, BLM has joined forces with the Forest Service of the Department of Agriculture to establish the Great Basin Fire Center at Boise, Idaho. Fire-fighting efforts in Utah, Idaho, Nevada, eastern Oregon and northeastern California, where the most serious losses have occurred, will be coordinated by this center.

An even bigger problem is how to restore forage on depleted rangelands without drastic reduction of grazing during the restoration period. The Vale Project in Oregon has demonstrated that this can be done, providing the restoration does not coincide with drought conditions.

BLM also has a responsibility toward the game animals that inhabit these lands. About 3 million big game animals roam here—elk, antelope, deer, moose, caribou, mountain goats, bighorn sheep, and bear. As wild land acreage is compressed by population pressures, the public domain will become more and more valuable as wildlife habitat.

A recent inventory showed that 85 million acres constitute highly productive wildlife habitat. BLM has joined with the Nevada Fish and Game Commission and the University of Nevada to find ways of managing semiarid lands to improve big game habitat.

Under the Public Sale Act of 1964, it is now possible to sell land to local governing bodies and individuals for residential subdivisions and other urban uses if effective local zoning regulations exist. BLM has initiated seven pilot studies in six Western States to coordinate future land use planning with municipal officials. Citizens are taking an active part in decision-making, and county governments have demonstrated they are willing and able to assure the proper use of development of land leaving Federal ownership.

Regulations covering mineral leasing are being revamped to encourage economic development. For example, in accordance with recent legislation, coal acreage allowed on leases and permits has been increased fourfold. Other regulation changes will assure mineral lease-holders more secure tenure and, in most cases, lower down payment.

Timber and grass generally suffer most from fire. To combat fire losses, BLM has joined forces with U.S. Forest Service to establish the Great Basin Fire Center at Boise, Idaho.

As administrator of one-fifth of the land area of this Nation, BLM has considerable responsibility to preserve natural beauty. The following steps are among those planned:

(1) Commercial billboards and signs erected in trespass on public lands will be eliminated.

(2) Permits for power, gas, or other utility lines and for roads will include stipulations to preserve natural scenic values to the extent feasible; where practicable, joint use of easements by several companies will be encouraged.

(3) Leases or concessions for business sites, or small tract leases, will be granted only under terms that preserve or enhance the natural setting.

(4) Land disposal that would result in damage to aesthetic values will not be made.

(5) Where possible, full title or scenic easements to key scenic tracts of land will be acquired via land exchange or gift.

(6) All public lands multiple-purpose roads will be located and constructed so that natural values are preserved and scenic vistas opened as far as possible. Where feasible, cuts and fills will be revegetated.

(7) Litter, debris, severe erosion channels, and other eyesores will be cleaned up as rapidly as possible. Efforts will be made to prevent future damage.

U.S. Forest Service, U.S.D.A.

the POPULATION CHALLENGE

Population and Recreation

Outdoor Playroom

"It may be, that in the long run, over-population in this country will threaten the most important freedom we enjoy . . . the freedom each person must have to maintain his own integrity, to discover his natural self and be true to it."

Stewart L. Udall, Secretary of the Interior

Gene Daniels—Black Star

Steve Schapiro—Black Star

A nation must balance its work arenas, its transportation facilities and its living space, with areas devoted primarily to outdoor enjoyment. To do less is to sell its people short.

With the competition for prime outdoor space growing tougher all the time, the U.S. Congress took a major creative step toward providing for the recreation of its millions. The Land and Water Conservation Fund Act of 1965 was a bold new measure in the mounting battle to hold onto the needed outdoor recreation opportunities that remain.

Never before has Government had adequate financing to acquire desirable recreation lands and waters. But study after study in recent years pointed up the irreversible nature of land-use patterns. And as opportunities slipped away for want of acquisition funds, a little more of the legacy for the Good Life was lost.

Realizing that America's recreation future and continued existence of beauty in our environment rested on finding some dramatic new means of preserving these last few opportunities, Congress authorized a new program of outdoor recreation

grants to States and their political subdivisions and a continuing fund for acquisition of Federal recreation lands.

The Land and Water Conservation Fund Act established a fund in the Treasury with revenues from three main sources: (1) entrance fees and charges at Federal recreation areas, (2) the 4-cent per gallon Federal tax on motorboat fuels, and (3) proceeds from sale of surplus Federal real property.

In addition, beginning the third year of the program, up to $60 million of appropriations per year would be advanced. The Fund is expected to provide an average of $180 million annually during the first 10 years of the program.

The Fund went into operation January 1, 1965, and Congress made a supplemental appropriation on April 30, 1965, of $16 million for the remainder of fiscal year 1965 ending June 30. Of this, States are eligible for $10,375,000. The remainder is available for acquisition of authorized Federal recreation areas, $4,805,000 for the National Park Service and $750,000 for the Forest Service.

Congress also appropriated $125 million from the Fund for fiscal year 1966. This included $84,377,000 for State uses, $21,883,000 for National Park Service, and $17,300,000 for Forest Service use.

The State portion is available to the States and through the States to their political subdivisions in a 50-50 matching fund program of grants-in-aid. These moneys are available for outdoor recreation planning, acquisition, and development. Priority attention will be given to meeting the needs of our growing urban population under the new program.

Bureau of Outdoor Recreation

The Land and Water Conservation Fund is administered by the Bureau of Outdoor Recreation (BOR). Each State has designated a liaison officer to work with BOR and the Bureau has provided technical assistance to the States in the necessary planning. The improved planning, greater acquisition, and increased development which will result will help to assure that America's outdoor recreation resources are used efficiently to meet the needs in a future when all resources will be limited.

Another BOR responsibility is preparation and maintenance of a nationwide outdoor recreation plan, due for submission to Congress in 1968. The Bureau also is engaged in comprehensive river basin planning, individual water project planning, and the review of selected water project reports.

Basic objectives of the Bureau's water resources planning studies are to help formulate plans to assure that use of water and related land resources will meet foreseeable short- and long-term recreation needs, and to assemble soundly-based outdoor recreation information for use by agencies or individuals with authority to act.

The intense national desire for adequate outdoor recreation areas and facilities and for a beautiful America cannot be satisfied through haphazard methods. The nationwide outdoor recreation plan will help insure orderly development of Federal, State, local, and private programs.

Recently, recreation philosophy has recognized that in addition to national parks and forests, other types of areas are needed. Out of this recognition sprang the idea of National Recreation Areas. Already the Congress has authorized

Proposed Wild Rivers legislation can help promote sound water conservation and public use and enjoyment.

establishment of a number of areas in this new category and many others have been proposed.

In May 1963, the Secretaries of Agriculture and Interior established a Wild Rivers Study Team. The team, headed by BOR, evaluated 72 rivers, conducted detailed studies of 12, and used existing detailed studies on 10 others. As a result, legislation to establish a National System of Wild Rivers was recommended in early 1965 by Secretary Udall and introduced in the Senate with 33 sponsors.

A related measure has been introduced in the House of Representatives. According to the proposed legislation, wild rivers should be left in free-flowing condition, or restored, to promote sound water conservation and public use and enjoyment.

In 1964, the Recreation Advisory Council, of which the Secretary of the Interior is a member, initiated a study of a National Program of Scenic Roads and Parkways. Under the chairmanship of the Department of Commerce, this study is expected to set criteria and recommend a program for developing a number of scenic roads and parkways throughout the Nation.

Also in 1964, Congress established a Lewis and Clark Trail Commission, following a study of the historic route by representatives of Federal agencies, States, local government, Indian tribes, and private organizations. BOR served as coordinator of the study. Congress has directed that the expedition route, across 11 Western States, be identified, marked, and preserved for the inspiration and enjoyment of the American people.

In 1963 the Secretaries of the Interior and Agriculture initiated interagency studies of the North Cascades Mountains in Washington and in 1964 of the Sawtooth Mountains in Idaho. The study team's evaluation will serve as basis for recommendations on future management and administration.

The Department of the Interior, working closely with the Departments of Agriculture and Defense, is conducting a conservation inventory of military lands. Headed by BOR, this program is aimed at realization of the recreation, wildlife, and other conservation potentials of these lands.

The Bureau also is conducting a comprehensive study of all Federal agencies contributing to outdoor recreation and is examining Federal assistance programs having an impact on outdoor recreation in the private sector of the economy.

Bureau of Reclamation

With 90 percent of an ever-increasing population participating in some form of open air sport, the Bureau of Reclamation is working intensively to develop its projects for maximum outdoor enjoyment.

In the early days of dam-building, recreation was an incidental byproduct. It soon became evident, however, that the reservoirs behind Reclamation dams were magnets for people who wanted to fish, swim, picnic, boat, or just look at the scenery. As time went on, more and more sportsmen and persons interested in nature found their way up the canyons to damsites, their number increasing steadily, even though for many years only scant and haphazard provision was made for their accommodation.

Recreation was recognized only as an incidental. Today, however, recreation is becoming a leading member of the benefit family. Reclamation's role in developing outdoor opportunities was dramatized during fiscal year 1965, when tens of thousands of visitors discovered Lake Powell. This beautiful blue lake, behind Glen Canyon Dam, is located on the Colorado River at the Arizona-Utah border.

When filled, Lake Powell will extend 186 miles upstream from the dam, have a surface of 162,700 acres and a shoreline of almost 1,900 miles. At locations scattered along the shore 10 recreation centers will be developed by the National Park Service.

A visitor center complex, designed to accommodate a visitor load already nearing 1 million annually, is under construction on the west rim of the canyon. Guests will view Glen Canyon, the Colorado River, the dam, and portions of Lake Powell from an 85-foot-diameter rotunda, part of which will overhang the canyon rim 700 feet above the river. Eventually the Colorado River will be the spine of a 1,000-mile long outdoor playground.

Lake Meredith, forming behind recently completed Sanford Dam on the Canadian River in Texas, is proving a powerful lure to people in that water-scarce region. Despite the fact that access roads, boat ramps, and other public facilities are not yet finished, visitors are flocking to the lake. The Bureau has entered into an agreement with the Park Service to manage the recreation area.

During 1965, tens of thousands of visitors discovered beautiful blue Lake Powell, forming behind Glen Canyon Dam.

Similar plans are being made for recreational facilities at the reservoir forming behind Yellowtail Dam on the Bighorn River in Montana, set in some of the world's most spectacular scenery.

Enactment of the Water Projects Recreation Act in July 1965, facilitated development of recreation facilities at Reclamation projects. It gave the Department of the Interior limited authority for the first time to develop recreation opportunities on existing projects. The same act provided for cooperation with State and local governmental agencies in recreation development on existing and new projects.

Some 210 recreation areas, subject to an organized program of recreation management, exist on Reclamation projects. They include more than 4 million acres of land and nearly 1.5 million surface acres of water.

With less land and water available every year for new recreation development, Reclamation projects hold hope for the future. Anglers can anticipate improved use of stored waters for sport fish production, and the recreation possibilities do not by any means stop there. Some 9 million irrigable acres of project lands are capable of satisfying substantial needs—not just for fishing but for the hunting of game birds, picnicking, camping, and hiking. Private owners of such

lands have a potential source of supplemental income from permitting such uses under suitable controls.

As the Bureau of Reclamation transforms its blueprints into great water resource projects to meet the material needs of a growing population, it is acutely aware of that population's aesthetic needs. In the day-to-day building and operation of its projects, the agency has intensified its efforts to refrain from marring the natural beauty of the countryside; to restore it where marring is temporarily unavoidable; and to enhance it when possible.

Placing out of sight those structures which do not contribute to the landscape is one way in which Reclamation is conserving outdoor beauty. The underground powerplant at Morrow Point Dam on the Gunnison Project is an example of this approach; so also is the underground installation of power lines at Glen Canyon Dam. Excavation waste is being deposited where it will be inundated after storage of water is begun, and the seeding and landscaping of canal excavations

are helping to retain the charm of project terrain. A luxurious lawn at Shasta Dam has become a public attraction because of the deer who come at twilight to crop the grass.

The National Park Service

The National Park Service has been charged by Congress with managing the resources of the National Park System for the continuing benefit and enjoyment of all the people. The National Park Service is, therefore, a people-serving agency. It also is a resource-managing agency.

In recognition of today's changing needs, a comprehensive study of the long-range objectives, organization, and management of the National Park Service was undertaken. Basic to that study were the legislative enactments that have shaped the National Park System since the establishment of the first National Park at Yellowstone in 1872. It is clear that the Congress has included within the system three different categories of areas—natural, historical, and recreational.

Natural areas are the oldest category. A little later historical areas began to be authorized culminating in the broad charter for historical preservation set forth in the Historic Sites Act of 1935. In recent decades, with population growth pressing for more open space, the urgent need for national recreation areas is receiving new emphasis.

The long-range study brought into sharp focus the fact that a single broad management concept encompassing these three categories of areas within the System is inadequate. Each category requires a separate management concept and a separate set of management principles. These, in turn, require coordination to form one organic management plan for the entire System.

There is equal need to identify the long-range objectives of the National Park Service. These objectives were developed by the Service and approved by the Secretary as follows:

(1) To provide for the highest quality of use and enjoyment of the National Park System by increased millions of visitors in years to come.

(2) To conserve and manage for their highest purpose the the natural, historical and recreational resources of the National Park System.

(3) To develop the National Park System through inclusion of additional areas of scenic, scientific, historical and recreational value to the Nation.

(4) To participate actively with organizations of this and other nations in conserving, improving, and renewing the total environment.

(5) To communicate the cultural, inspirational, and recreational significance of the American heritage as represented in the National Park System.

(6) To increase the effectiveness of the National Park Service as a "people serving" organization dedicated to park conservation, historical preservation, and outdoor recreation.

Today, more than 7 out of every 10 Americans live in cities. This is a fact of our times, and to romanticize about the pastoral happiness of life in a village community is to ignore the basic reality which faces the large majority of our society. Our challenge is to develop an intelligent and dynamic equilibrium between America's limited store of natural resources and the ever-more-complicated requirements of modern life.

The basic requirements of modern life need not be in diametrical opposition. It is not necessary to destroy natural beauty to build a road. It is not necessary to pollute a river to operate an industrial plant. A proper synthesis can and must be found.

In 1956, at the beginning of the National Park Service's Mission 66 Program, it was predicted that visits to the areas of the National Park System by 1966 would total 88 million—a figure then so startling that some believed it unreasonable. Today that mark is far behind us; we now forecast 117 million visits for 1966. Our rapid population growth and shrinking areas of unspoiled open space present a unique challenge, available only to this generation. If we muff it we can never again hope for such an opportunity.

In a sense, the drive for a more beautiful America is epitomized on the form of the seven dollar Conservation-Recrea-

tion automobile passes that served as vacation passports for tens of thousands of motorists who entered Federal parks and recreation areas last summer. This represents part of the pay-as-you-go financing authorized by the Land and Water Conservation Fund Act.

The Fund may well prove to be the single most powerful conservation instrument this Nation has yet devised, drawing together the park and recreation objectives of all levels of government.

During the past 5 years Congress has reflected America's growing awareness of the need for more parks and recreation areas by enacting a record-breaking amount of conservation legislation. We have seen five National Seashores created; we have witnessed establishment of America's newest National Park at Canyonlands in Utah, and we have seen authorized for the first time a new type of park—the Ozark National Scenic Riverways in Missouri.

On September 1, 1965, President Johnson signed a bill designating 72,000 acres on the Upper Delaware River as the Delaware Water Gap National Recreation Area. The area, at the site of the proposed Tocks Island Dam and reservoir, will provide swimming, fishing, boating, camping, hiking, and picnicking in the heart of the most densely populated region of our land. It is estimated that about 30 million persons live within 100 miles of the planned development.

On September 21, 1965, the President signed a bill to make Assateague Island a National Seashore, preserving a 33-mile-long barrier reef off the Maryland and Virginia shorelines—a near-wilderness stretch which is just about all that is left of one of the world's loveliest coastlines. The action pointed up the fact that of the 3,700 miles of shore along the Atlantic and Gulf coasts, only 105 miles remain available for public use.

The first session of the 89th Congress passed legislation providing for establishment of the Nez Perce National Historical Park, Idaho; and Agate Fossil Beds National Monument, Nebraska.

Support for establishment of more than a score of additional parks, recreation areas, and historic sites has been announced. The proposals represent every part of the country and would add significant new recreational and historical riches to our straining Park System.

By Presidential Proclamation, Ellis Island was added to the Statue of Liberty National Monument on May 11, 1965. Formal establishment of the Fort Smith National Historic Site, Arkansas, occurred on October 23, 1964.

Additions to our Federal parks and recreation areas are aimed primarily at serving the Nation's more highly urbanized areas. To these hundreds of millions of urban citizens, outdoor recreation is becoming an increasingly precious element in their total environment.

In June 1964, President Johnson met with members of the National Geographic Society, the Department of the Interior, and outstanding conservation leaders of the Nation to discuss the protection of the remaining Coast Redwoods of California (Sequoia-sempervirens). He requested the Secretary of the Interior, working with interested groups, to conduct a study on the desirability of establishing a Redwoods National Park in California. An interim report based on this study brought comments from more than 3,000 individuals. The ultimate location and size of such a park are matters yet to be determined.

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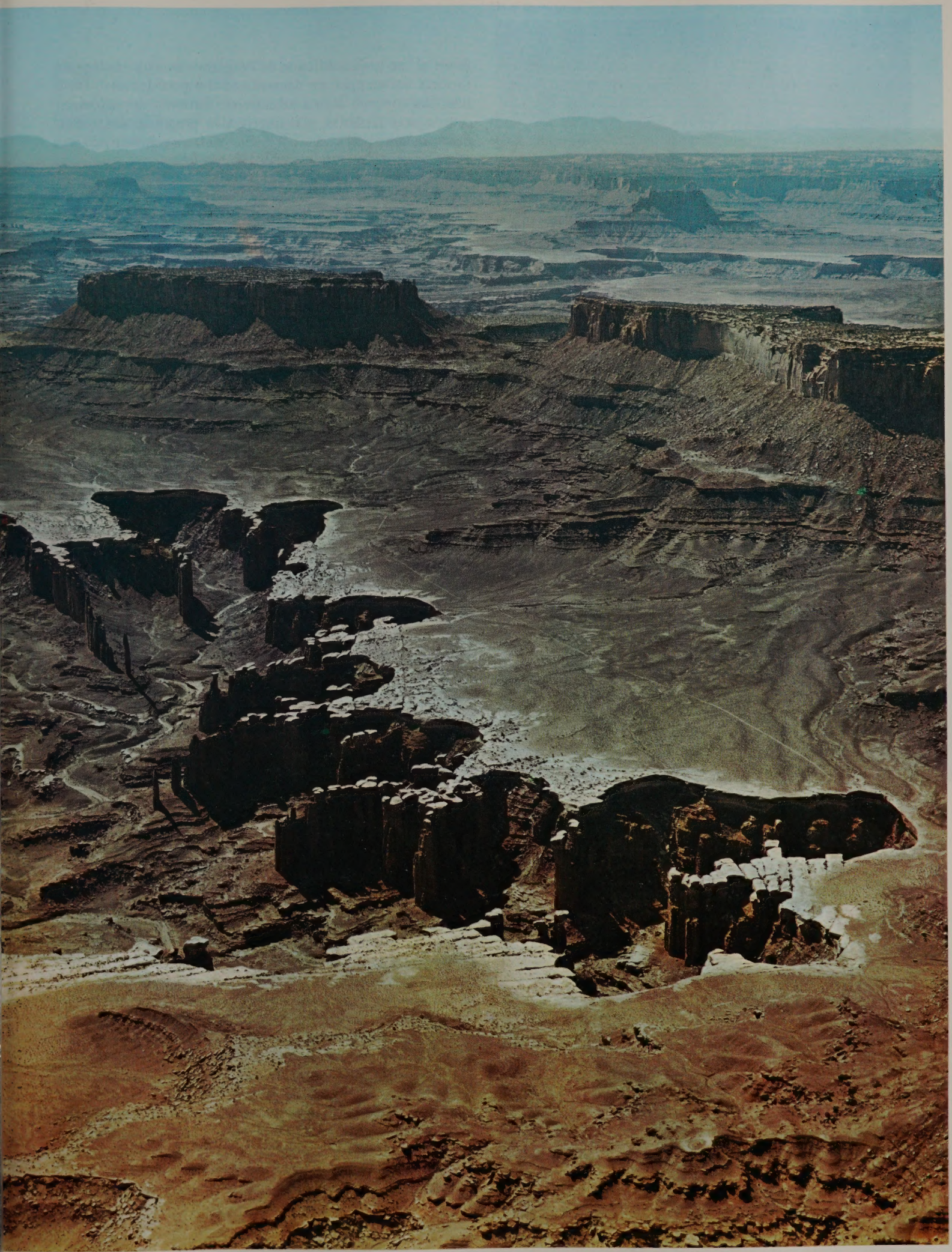
Laurence Lowry—American Heritage



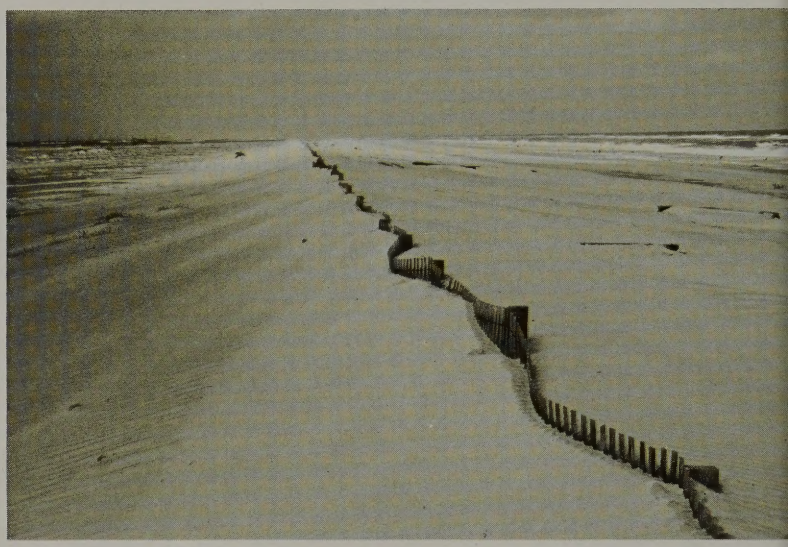
Canyonlands National Park, Utah

The answer to the mounting needs for expanding outdoor recreational opportunities certainly lies partly in an expanded National Park System. But of equal importance is improved management of areas already within the System.

In many of our National Parks the natural equilibrium has been subtly affected by new forces which disturb the ancient rhythms of life. Even protection itself has in some cases interfered with natural processes. Fire prevention and the protection of certain animal populations against predators are but two examples.

The extension of conservation and preservation concepts beyond park boundaries is exemplified in the Landmarks program of the Service. Citizens, organizations, and governmental units are encouraged to participate in the task of preserving bits of the American natural, archeological, and historical heritage. Under this program, over 600 historical and archeological sites, and 17 natural areas have been identified as having national importance. The awareness and participation which the Landmarks program evokes, help mold the conservation attitudes of the citizens who participate. Last year 60 additions brought the total on the Landmark Registry to 608 throughout the United States.

The Delaware Water Gap National Recreation Area



Assateague Island National Seashore, Md.–Va.

Park areas may also serve as outdoor nature laboratories. In cooperation with university scientists, the Service has completed a Park Natural Science Research Plan for Isle Royale National Park, and a similar Research Plan for Sequoia-Kings Canyon National Parks is well advanced.

The National Park Service Advisory Committee on Natural History Studies, visited Everglades National Park during the year and evaluated fresh-water supply problems there in terms of their impact on the ecology of the park. The Committee's findings contributed to the Service's decision to obtain emergency interim releases of water from the Flood Control District of Florida pending a longer term solution to the problem.

Almost 110 million visits to areas of the National Park System were recorded in 1965, presenting Park Service personnel with the dual tasks of providing accommodation, recreation, safety, and enjoyment, while at the same time safeguarding the natural, historic, and recreational resources involved.

Facilities in most parks—although vastly improved as a result of the 10-year Mission 66 Program—are still inadequate to meet the stepped up demands of the past decade. Long lines are common sights at entrance stations, campgrounds, concessioner facilities, and interpretive programs and activities. In most parks seasonal traffic jams are common at areas of outstanding interest.

A significant re-evaluation by the Service of its park interpretation and exhibit programs has been made. The increase in visits to the National Parks during 1965 saw a parallel increase in attendance at personally conducted interpretive programs. These services, epitomized by the campfire programs and guided tours, are considered by many park visitors to be the most meaningful part of their park experience. Yet their effectiveness has been greatly reduced because of growing crowds of visitors and insufficient manpower to do the interpretation job.

More and more the Service has had to rely on self-guiding and audiovisual devices. Self-guiding facilities capable of handling greater numbers of people are being developed and the use of leaflets is on the increase. Last year, some 13 million free folders were distributed and still this was not sufficient to meet the demand. Audiovisual communication is one element of the Service's program which can expand rapidly and economically. Wherever possible, however, such devices will be used to complement but not to replace personal services.

Even the patterns of camping are in a state of flux. A recent study shows that only slightly more than 50 of every 100 camping parties now use the conventional canvas camp tents on the ground. Forty-one percent camp in house trailers, in camper coaches, in station wagons, and in specially equipped busses. In 1956, the National Park System had approximately 12,000 campsites. By the end of 1965, approximately 28,400 were available. By 1974, it is anticipated there will be 35,000 sites available. And perhaps we will have to strike the word "available," since the number of campers vying for them probably will exceed the supply. In cooperation with the Federal Aviation Agency and the Montana Aeronautics Commission, an airport has just been completed at West Yellowstone, Montana. In a similar cooperative agreement,

Tusayan Airport serving (South Rim) Grand Canyon National Park, Arizona, is expected to become operable during 1965.

The master plans which regulate overall management and facilities development of various parks in the System, anticipate expansion where such expansion is feasible. Reserve areas also are designated for development when visitor use demand exceeds the carrying capacity of existing facilities. However, construction of additional visitor-use facilities must be tempered by restraint when over-development might do irreparable damage to the prime features for which the parks were established.

As public use continues to climb, Service responsibility for protection of visitors, personal and public property, and park resources, becomes increasingly acute. Analysis of accidents and crimes within parks, for example, indicates that frequency of offenses accelerates at a proportionately greater rate than does the number of persons present.

Park environments are not stable entities. Plant communities as well as wildlife populations are subject to external influences—particularly the direct impact of human use. Conservationists today are concerned with the fact that park boundaries drawn on a map are not proof against invasion by power and irrigation developments, pesticides and polluted water, and the ever-mounting litter thrown about by the American people.

The National Park Service publication, *Road to the Future*, has charted the course of action to be followed in conserving and managing the natural, historical, and recreational resources of the National Park System. Under this guide, full consideration is being given to the interrelationships between plants and animals and visitors and to individual-area objectives. The constantly increasing numbers of visitors and resulting pressures on park resources continue to challenge the initiative and ingenuity of park personnel.

In the Nation's Capital, the Park Service's National Capital Region has enthusiastically taken up the program of floral beautification. Region plans provide for new floral displays in 116 park areas, new and improved parkways and scenic roads which serve as approaches to the city, development of The Great Mall and Pennsylvania Avenue, a National Rose Garden, and many other such projects.

In January, the National Aeronautics and Space Administration asked for National Park Service help in planning a Visitor Information Center on Merrit Island, adjacent to Cape Kennedy, Fla. The Spaceport promises to be a major tourist attraction in Florida by the time the Visitor Information Center is completed in 1967—prior to the "moon shot" scheduled to go before 1970.

Bureau of Land Management

The 1964 public lands legislation opened the door for additional land uses—campgrounds, hunting, fishing, rockhounding, community expansion and others. With 112 campgrounds already in operation, the Bureau of Land Management (BLM) began developing 11 more sites in 1965 to accommodate the surge of campers. With the new sites, a total of 1,600 tent and trailer units will be available in areas of intensive use. But there are few "off limit" areas on the

Joern Gerdts—Time

Proposed Redwoods National Park, California

public domain and many campers prefer to seek lonely campsites in the valleys, mountain meadows, or desert wildness of the West.

More travelers will choose the public domain for outdoor enjoyment as these lands become better known. Natural wonders, historic sites, and scenic areas exist in great numbers, but they must be identified, mapped, and in some cases fenced, to be suited to public use. Hunting and fishing areas and rockhound haunts need identification. Travelers need maps and interpretive literature, directional signs, and access roads.

More travelers will choose the public domain for outdoor enjoyment as these lands are better known.

To assure the best outdoor use by the greatest number of people, future plans include:

(1) Facilities which permit longer seasons and wider distribution of use;

(2) Attention to shoreline recreation opportunities;

(3) Participation in planning for roadside rest stops, overlooks, scenic corridors and other features;

(4) Protection of "wild river" areas;

(5) Development of trails that will open up many natural attractions by foot, horseback, bicycle, or car.

A search has revealed more than 100 areas of unusual scientific interest on the public domain—ice caves, massive landslides, rare forest species, and other natural wonders, to name but a few. So far, 16 of these areas have been dedicated by the Secretary of the Interior as scientific "outdoor laboratories," available for study by persons attached to universities or other institutions.

Bureau of Sport Fisheries and Wildlife

One of America's high priority programs is developing and maintaining its fish and wildlife resources. In a real sense, this program is essential to the integrity and individualism of man. One man likes to fish; another likes to hunt; one prefers to prowl a bird refuge with his camera; still another spends hours at the window of his home, watching the feathered partakers of his birdseed hospitality. To all these individuals the presence in this world of other species spells some kind of inner fulfillment or contentment.

The effort on behalf of fish and wildlife began half a generation ago; it is still in the process of tooling up. But with a burgeoning population, half of which is under 28 years of age and whose major impact on our fish and wildlife resources is just beginning to be felt, it is suddenly necessary to do the best we can as fast as we can with what we have.

The population explosion, as it relates to the fish and wildlife resources, has three distinct characteristics:

(1) Destruction of fish and wildlife habitat;

(2) Greater demand for recreational outlets because of increased leisure time;

(3) Accessibility by people to almost every corner of the Nation due to improvements in transportation, resulting in a continental—even a worldwide—concept of conservation.

The Bureau of Sport Fisheries and Wildlife (BSFW) carries a great part of the Federal responsibility for maintenance of the Nation's sport fish and wildlife resources. It must help provide more fish per acre of water and more wildlife per acre of land, converting low yield areas into high yield producers and creating new habitat wherever possible.

Until about two decades ago, land and water development projects meant destruction of fish and wildlife. Impounded waters flooded bottom land habitat and stream fisheries, blocked migratory fish from spawning grounds and altered stream flows and water temperatures. Reservoirs often became barriers to land migrating animals and usually themselves deteriorated into habitat for undesirable fish species.

BSFW welcomed its chore of accentuating the positive and correcting or softening the negative. Establishment of trout fisheries in the cold tail waters below dams is one feature of this overall assignment. Because of a succession of such laws

as the Fish and Wildlife Coordination Act, the Drainage Referral Law and amendments to flood control, small watershed and soil conservation legislation, plus extensive research and improved management, fish and wildlife resources now have an improved chance of survival in strength.

Close coordination with the Department of Agriculture's Soil Conservation Service is helping solve some serious problems in the field of soil conservation. An understanding with the U.S. Bureau of Public Roads has resulted in closer cooperation between State highway departments and State fish and game departments. Destruction of waterfowl and fish habitat by drainage has been slowed. But land prices and the tendency of some communities to resist Federal ownership of land make the acquisition of wildlife refuge areas difficult. As population pressures increase, the acquisition program will encounter additional impediments.

Grizzly bears are radio tracked

For endangered species, many refuges offer inviolate sanctuaries.

Bald eagle being banded

The National Wildlife Refuge System will have to provide for an ever increasing public use of its fish, wildlife, land, and water resources. A Refuge Recreation Act and the Land and Water Conservation Fund Act, both recently passed, recognized recreation as a needed use of the system. The current 13 million annual visitors to the refuges are but a forecast of the future.

Refuges serve wildlife in many ways—resting, feeding, and at times nesting areas for migratory game birds and songbirds; feeding and resting places for mammals. Generally speaking, they contribute havens for waterfowl, although at times and under certain conditions controlled hunting is permitted. For endangered species, many refuges offer inviolate sanctuaries. In times of extreme stress, refuges can be incubators for the rebirth of some species or a port of last resort for others.

The first national refuge was established six decades ago, but the refuge system as it exists today is only half that age. In the past 30 years by purchase, public land order and, in a few instances, by gift, refuges have been established at strategic places in the country.

Our 300 National Wildlife Refuges and game areas total 28½ million acres. Of these, 239 refuges, with 3,660,000 acres, are primarily for waterfowl. This represents a little less than half of the total amount of well distributed areas the Federal Government should control to maintain the waterfowl resource and permit reasonable utilization.

The goal of the States is 4 million wetland acres. Seven new refuges were established in 1965, and nearly 150,000 acres of good wetlands were brought under Federal control in the prairie "pothole" region. The Accelerated Acquisition Act which authorizes a $105 million loan over a period of 7 years and the Revenue Sharing Act which gives counties a more equitable share of refuge receipts are helping acquisition. The loan is to be repaid from future duck stamp revenues.

A Bureau-appointed Committee on Rare and Endangered Species has been active for almost a year. A countrywide consensus indicates that more than 300 mammals, birds, fishes, reptiles, and amphibians need special attention. About 75 of these may be gravely threatened with extinction. In some instances, refuges are available to the endangered species, as in the case of Aransas National Wildlife Refuge, Texas, for the whooping crane. In others, such as those involving the Everglade kite in Florida and Mississippi sandhill cranes, the problem is preservation of habitat. Research programs continue on artificial propagation of some endangered species for reintroduction into the wild.

In the area of sport fishing, the Bureau has a three-pronged program of research, hatchery management, and advisory services to Federal agencies and Indian tribes. In emergencies, this advisory service is extended to private individuals or firms.

Large public reservoirs comprise about a third of the Nation's inland fishing waters and attract a fourth of all sport

The future will see more emphasis on quality control in the Bureau's fish production program. The goal is to produce fish which will thrive in wild waters and give sport fishermen the kind of fishing they want.

anglers. Angler days will double in the next 10 years, and yields on existing reservoirs would have to be increased 30 percent just to maintain present catch per angler-day. Biological data on 640 large U.S. reservoirs have been assembled and catalogued.

Coastal waters in which fishing has increased 40 percent in 5 years will account for nearly one-third of the national fishing effort in the year 2000. Bureau laboratories, in operation at Sandy Hook, N.J., and at Tiburon, Calif., are doing research on coastal game fish.

The future will see more emphasis on quality control in the Bureau's fish production program. The goal is to produce fish which will thrive in wild waters and give the sport fisherman the kind of fishing he wants. To provide for these changing needs, hatchery programs must be ready and able to shift direction. Currently, the emphasis is on production of more thrifty and energetic fish and a selection of species which fit the needs of the new habitats—trout for the cold tail waters below dams, various combinations of species for the situations which can develop above the dam.

The old railroad fish car, for three-quarters of a century the accepted vehicle for transporting fish, has been replaced by the more efficient fish truck for short distances and by the airplane for long distances. During May, some 5 million trout were transported by airplane several hundred miles from hatcheries to Lake Powell on the Colorado River and dropped into the water from special bottom-opening tanks. Nearly 3 million fish were airdropped into reservoirs in Kansas.

Other planes have transported American-produced striped bass larvae and steelhead eggs to Russia, Atlantic salmon and blueback salmon to the United States from Russia, rainbow trout to Yugoslavia in return for that country's famous ohrid trout, and half a million Australian strain rainbow trout purchased from "down under." Mailing fish in plastic containers to local pond owners is now feasible.

Fishing and hunting, once a major source of food for the American table, later pastimes for the affluent, now give employment to thousands who provide the goods and services to those who spent nearly $4 billion in 1960, the year of the most recent survey. The figure now is undoubtedly higher and a new survey is planned for 1965.

In the spring of 1965, the Bureau organized a wildlife advisory service which will help Federal agencies, Indian tribes and, in some instances, private landholders develop wildlife habitat, particularly for migratory game birds.

Federal aid programs, operated primarily by States under broad supervision by the Bureau, are helping to create new fishing lakes, to improve existing lakes and streams, to furnish access to new areas, to purchase and develop wildlife habitat, to conduct research programs, and to improve management practices.

Since the fish restoration program (Dingell-Johnson Act) began in 1951, 155 fishing lakes containing 26,000 surface acres have been built or restored. An additional 54 lakes have been created with the help of wildlife restoration funds (Pittman-Robertson Act, 1937) for the benefit of both fish and waterfowl. Another 3 million acres of fishing waters have been opened to the public through purchase of 900 access sites.

Nearly 50 million acres of hunting have been made available to the public by States, using wildlife restoration Federal Aid funds, and millions of acres have been opened to the public by purchase and development of access sites and roads.

One of the Bureau's answers to the preemption of waterfowl habitat by human populations is the Northern Prairie Wildlife Research Center near Jamestown, N. Dak. It is hoped that

Harvest Magazine

One of the most promising developments for public understanding of the underwater world is the National Fisheries Center and Aquarium—a combined research and recreational facility to be constructed in Washington, D.C.

information can be developed which will show how to manipulate the environment to raise more ducklings on fewer acres, create new production areas out of lands not needed for higher economic use, and manage waterfowl populations for minimum conflict with agriculture.

The Bureau's Patuxent Wildlife Research Center at Laurel, Md., is making progress in the utilization of bottom lands, marginal for agriculture and industrial purposes, and now supporting only low-quality timber.

While work is progressing on development of habitat, increasing the yield and improving techniques for determining reasonable hunting allowances, the supply of available game is being increased through "crackdowns" on dishonest hunters.

Each year about 6,000 game law violators are brought before the courts through the work of Bureau agents, with the cooperation of States and other Federal agencies. After more than 2 years of undercover work, Federal and State officers, in one coordinate action, charged 77 persons in 11 States with felonious sales of migratory birds. In addition, American "sportsmen" who have made a practice of violating Mexican game laws and returning to the United States with excessive bag limits felt the heavy hand of the law. A concerted effort on the part of Mexican and U.S. Federal and State game officials, the Bureau of Customs and the Immigration and Naturalization Service brought many of these culprits to justice.

A rabies epidemic among coyotes in the Western States half a century ago and a plethora of insecticides which, often by misuse, threaten both the human and wildlife resources of the Nation, launched the Bureau upon two of its important programs.

The first, which started with the control of rabid coyotes, waxed into a predator control program. This program is being continuously modified and increasingly restricted as new social values add to the need for husbandry of all wildlife and ecology demonstrates that complete eradication of predators can have dire consequences.

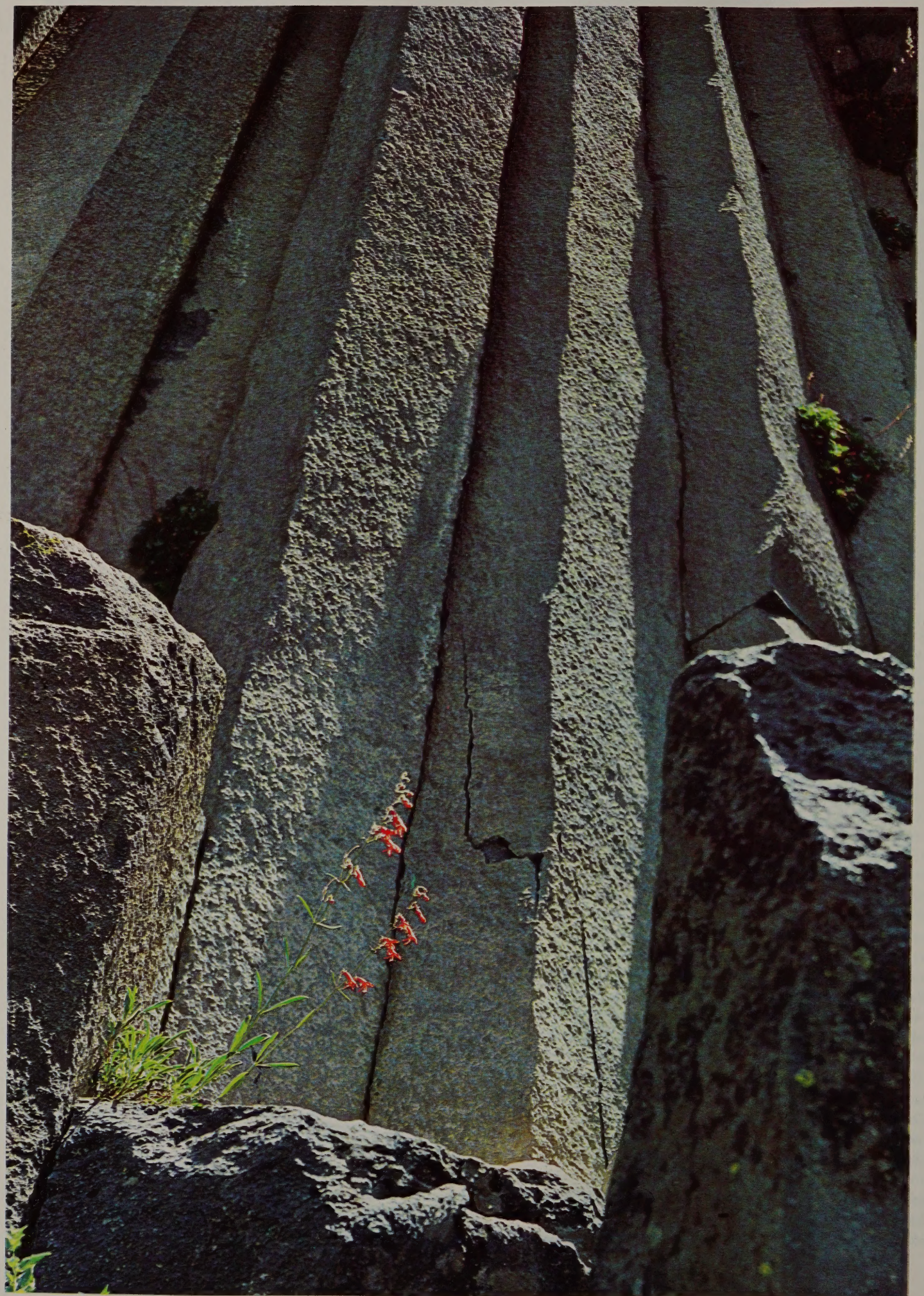
In predator control, chemicals are the newest and one of the most intriguing possibilities. Research falls generally into two categories—the search for techniques which will save crops from bird and mammal pests without harm to humans, fish, or wildlife, and the search for chemosterilants which will temporarily inhibit the reproduction of local pest populations.

The field of pesticides investigation is new, large, and complex. BSFW is launching a full-scale study of the thousands of chemical compounds used as pesticides and their effects on both fish and wildlife.

Colleges and universities are brought directly into fish and wildlife conservation through Cooperative Units. Thirteen have Cooperative Fishery Units and 18 have Cooperative Wildlife Research Units.

One of the most promising developments for public understanding of the underwater world is the National Fisheries Center and Aquarium—a combined research and recreational facility to be constructed in Washington, D.C. An expenditure of $10 million, repayable from admissions and user fees, has been authorized. Construction is scheduled to start in 1966.

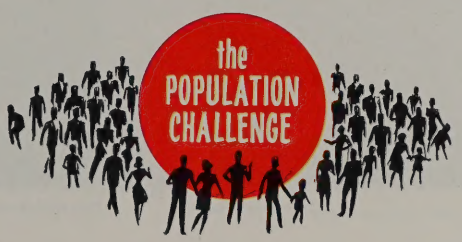
The recreation opportunities of future sportsmen will depend on the extent to which we have access to the out-of-doors. Quietly, undramatically, day by day, America's outdoor legacy is being nibbled away. Compared with the recreation opportunities we ourselves have enjoyed, what will remain for the generations that follow? It is only the foresight of today that can be translated into the heritage of tomorrow.



Devil's Postpile, near Yosemite, Calif.

So Much and No More

". . . government has as much a duty to protect the land, the air, the water, the natural environment of man against such (technological) damage, as it has to protect the country against foreign enemies and the individual against criminals . . ." Vice Admiral H. G. Rickover, U.S. Navy



Population and Nonrenewable Resources

Metals, nonmetal minerals, and fossil fuels are among the important foundation stones of our modern economy. They form the essential base for an ever-greater profusion of products and services. Yet minerals play their parts so unobtrusively that we rarely recognize the countless ways in which they affect our daily lives.

How often, upon opening a refrigerator door, do we think of the metals, the ceramic coating, or the mineral-derived plastics, with which this everyday appliance was made—or the refrigerant gas, also a mineral, that enables it to function? How often do we see a television set not as an instrument of entertainment and instruction, but as a complexity of metallic and nonmetallic parts?

The average automobile represents a raw materials investment, in metals alone, of nearly 2 pounds of magnesium, 23 pounds of zinc, 32 of lead, 36 of copper and copper alloys, 76 of aluminum, and over 2,600 pounds of iron and steel. Last year new car output totaled approximately 8 million vehicles. By the end of this century, when U.S. population will be nearly twice its present size, automobile production may have tripled.

As we strive to retain and improve the quality of our environment despite the pressures of population growth, to raise the living standards of additional millions of our people, and to help the world's emerging nations, the strain on our limited and irreplaceable resources must inevitably intensify.

Science and technology will not be able to provide the ultimate solution for all problems but they can help ease the strain. Their benefits can be realized, however, only by diligence, and their course must be charted with imagination, foresight, and exceptional skill.

The Bureau of Mines

During the 1965 fiscal year the Bureau of Mines continued a program of research and investigation and a variety of closely related supporting activities aimed at finding new and improved methods to prolong and even amplify our mineral abundance. Following are some of the achievements which have resulted from the Bureau's many activities in mineral resources research and development, helium conservation, and health and safety of miners working underground.

The national helium-conservation program moved smoothly forward. This effort conserved nearly 3.5 billion cubic feet of helium—bringing to 7 billion cubic feet the total volume saved since the program started in 1963.

This gas, extracted by private industry from helium-bearing natural gas, will be used in ever greater volumes in the years

Bethlehem Steel Corp.

Open hearth tap

Dan McCoy—Black Star

ahead for applications essential to national defense and to the advancement of scientific research and space exploration. It also has application in quality-control of many consumer items, ranging from candy mints and wine to refrigerators, air conditioners, and wonder drugs.

Before the helium conservation program was initiated this unique resource was wasted at the rate of about 5 billion cubic feet a year. The natural gases containing it were burned for fuel and the inert, nonflammable helium passed unused into the atmosphere. The conservation program now in effect has stopped approximately three-fifths of this waste and promises an adequate supply of helium until the year 2000.

But if we hold to the prevention-of-waste concept as being sound conservation policy we must acknowledge that the conservation task is not yet fully accomplished. Preventable losses of helium continue at the rate of roughly 2 billion cubic feet a year. But prospects are that private industry is about to take on part of what remains to be done.

Planning research that will help insure adequate supplies of minerals for some 400 million Americans a few decades hence requires a comprehensive knowledge of the resources we have at hand as well as those we may be able to obtain elsewhere. To acquire such knowledge the Bureau combines the varied talents and backgrounds of mining engineers, economists, metallurgists, statisticians, and other specialists, in studies both at home and abroad. The results of this effort serve not only as guides for planning Bureau research, but also, in published form, as aids to industry, to businessmen and investors, and to other segments of the American public.

In recent months the Bureau added to its three-volume Minerals Yearbook a fourth (international) volume, containing reviews of mineral-resource and mineral-industry developments in 130 countries and areas throughout the world.

The Bureau's economic and engineering studies are being combined with its scientific research capabilities in a war on blight in our ever more affluent Nation. Paradoxically, the closer we come to being a Nation of mostly two-car families, and the more leisure we acquire, the less natural beauty there is to enjoy from our highway system. The landscape in many parts of our country—at least those pieces of it that can be seen between the billboards and through a deepening haze of polluted air—is all too often a nightmare jumble of rusting, abandoned auto hulks and of earth ravaged by the quest for essential minerals.

Abandoned autos are a major and growing example of blight which stems from prosperity. Last year Americans bought some 8 million new cars. This year they will throw away 5 million old ones. Five years from now, according to forecast, they will be discarding old autos at the rate of 7.5 million annually. Right now the auto graveyard is a ubiquitous eyesore. And were it not for the operations of the scrap iron and steel industry, which turns used metal into rejuvenated raw material, the great American junkpile would have grown even faster.

But as of now, changes in steel production technology have softened the scrap dealers' markets; the incentive to salvage these discarded lumps of metal has been severely weakened.

George Leavens—Time

Bureau of Mines research is turning this dead-end into a round trip.

Metallurgical research by the Bureau is advancing the development of a process that promises to help convert part of these auto graveyards from a national eyesore to a national asset. Ferrous metal scrap, in finely shredded form, would be used in magnetizing a plentiful variety of low-grade iron ore which then can be converted to a semi-ore-concentrate. By bringing these domestic ores into utilization the Bureau's process would create a valuable new natural resource and, hopefully, help to revive the economy of several iron-mining areas of the Northern Lake States region. At the same time it would be a significant contribution towards abating the auto graveyard problem.

Buttressing the metallurgical approach, is a comprehensive economic and engineering study of the reasons underlying the junk auto buildup. A major objective is to find a profit incentive to stimulate conversion of the autos back into valuable raw material. Scrap, the Bureau believes, is a resource upon which industry must rely ever more heavily, as our needs for metal grow.

Polluted air, that dims the luster of American cities and brings discomfort and distress to eyes, noses, and lungs of their inhabitants, has been indicted as a serious menace to health and comfort and to aesthetics. Day and night across the land, products of incomplete combustion are funnelled skyward through thousands of smokestacks and puffed from millions of tailpipes.

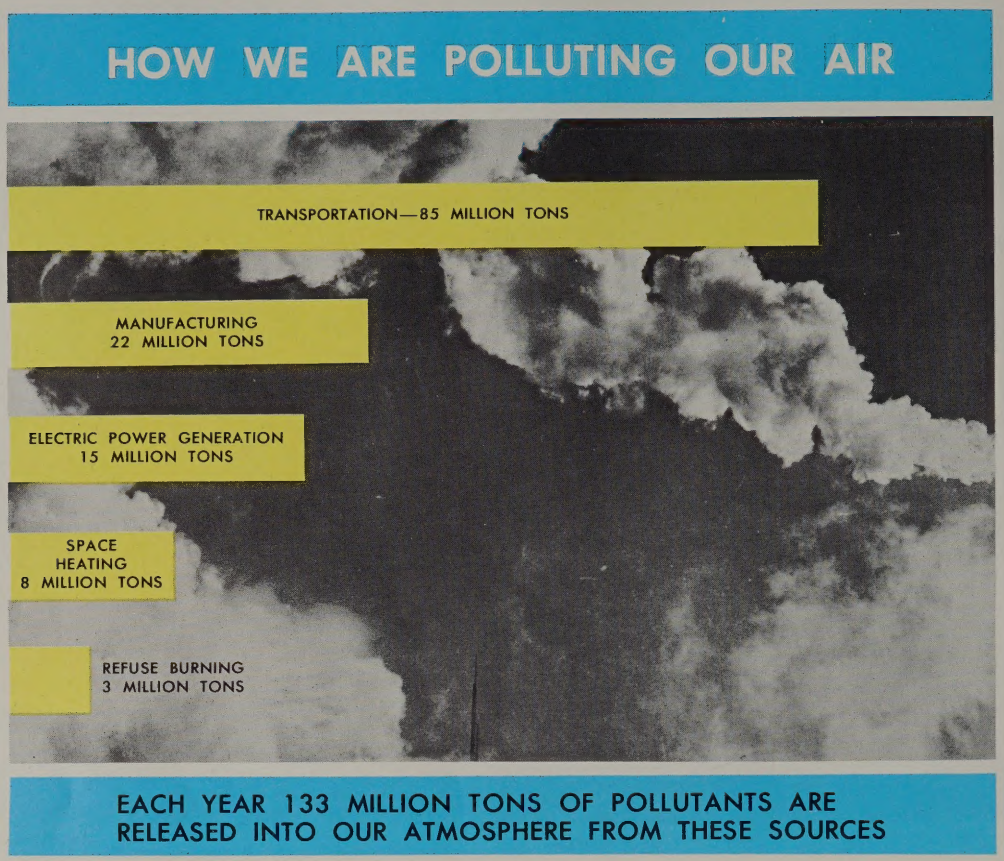
Besides dirtying the American scene and endangering human health, air pollution represents a deplorable waste of valuable fuel resources. We know that from 5 to 7 percent of our motor fuel consumed is exhausted unburned, or only partly burned. By the end of this decade, this annual wastage will be equivalent to between 100 million and 140 million barrels of oil.

Air pollution research, broadened steadily by the Bureau since its earliest studies in mine and tunnel ventilation, is now being applied to the Nation's smog problem. Bureau scientists are pursuing development of methods for reducing discharge of sulphur dioxide—a major industrial pollutant, chiefly associated with the burning of coal and fuel oil, but also in the stack gases discharged by many ore smelters. The Bureau's recently developed alkalized-alumina process is one of three that holds promise for reducing this type of air pollution.

Sulfuric acid, created when water flows over exposed pyritic (sulphur-containing) rocks, present to some degree in thousands of miles of the Nation's streams. The Bureau is collaborating with the Department of Health, Education, and Welfare in a joint effort aimed at determining the relative effectiveness of a variety of control methods. Three demonstration projects will ultimately be activated.

Progress also was made during the year in controlling two other sources of blight and hazard—fires in coal seams, and the subsidence or sagging of the earth's surface that can occur when old mine supports give way.

The Bureau completed 22 fire-control projects during the year, continued control efforts on 9, and planned 19 new proj-



Some goals of Bureau of Mines programs are the control of mine fires . . . prevention of mine subsidence damage . . . and the development of a marine technology of mining which will enable man to discover and extract the mineral wealth of the ocean.

ects, 12 of which will be carried out under Appalachian Regional Development Act authorization.

Two subsidence projects were completed, using material from old culm banks to fill underground mine voids and thereby support the sagging surface. Two similar projects, both in the Pennsylvania anthracite region and both to be conducted under the Appalachian Regional Development Act, are planned.

Prevention of subsidence damage is a major objective of the mining research program. Under study now is the use of wastes from mineral-processing plants to support mined-out areas underground. Openings are filled with a slurry of waste solids and water, which is then allowed to drain off, leaving the solid, compacted "fill" to support overlying strata. Use of this system would leave the land virtually intact, and the huge waste piles, or "tailings," now marring many a millside landscape, would begin to disappear.

The Appalachian program also authorized an intensive study of surface mining, a method of obtaining minerals and fuels from low-grade deposits. Unfortunately, this cheap method of recovery also menaces natural beauty and the public welfare and so a nationwide study of surface mine reclamation will be undertaken.

Bureau engineers, jointly with the Geological Survey personnel will make an assessment of the mineral potential of areas being considered for inclusion in the National Wilderness Preservation System established by the Congress in 1964.

A vast potential source of minerals is the world's oceans. Valuable deposits are known to occur on the ocean floor and additional mineral wealth also lies hidden beneath it—witness the oil and gas already drawn from under-water wells. What is needed is a marine mining technology that will enable man to discover and to extract this wealth.

Development of such a technology is the goal of a new Bureau-industry program that became operational in fiscal 1965 with the launching of the Government's first marine-mining research vessel. Formerly an Army cargo carrier, this 65-foot boat has been overhauled and equipped for the new scientific job. Soon it will be joined at sea by a second, larger vessel for operations in deep water. Both boats will be used in developing new mining methods—methods that will permit economic recovery of minerals from the ocean floor not only in the relatively shallow waters of the Continental Shelf but also at greater depths farther out at sea, and ultimately, from hard-rock deposits beneath the ocean floor.

Despite all the progress made in oil and gas recovery, one barrel of oil is still left underground for every barrel that is brought up, and billions of cubic feet of natural gas remain locked in rock formations too "tight" to permit its withdrawal. A new "fracturing" technique may prove useful. Cracks into the structure are created by pumping a slurry of sand and liquid into the formation. These cracks are filled with chemical explosive which, when detonated, extend the original fracture system, often enough to permit oil and gas to flow more freely. In deep reservoirs, a more powerful fracturing force is needed. The Bureau is cooperating with the Atomic Energy Commission in studying the possibilities of using nuclear explosives to "loosen" such reservoir rock.

This same fracturing method, using a slurry under pressure, and an explosive device, is being studied by the Bureau as a possible key to unlock the vast oil-shale reserves. Such frac-

turing followed by ignition of the fractured oil shale in place and capture of the hot oil-soaked gas thus produced would permit by-passing the mining and crushing operations and would minimize defacement of the terrain.

The Bureau continued to work on improving metallurgical and other processes by which minerals are converted from raw ores to usable materials. Public patents—freely available for commercial use—were granted on more than a dozen Bureau inventions, mostly in the field of process technology. Industry increased its use of a Bureau process to recover mica in quantities to meet rising demands from producers of paper, plastic, roofing materials, electric insulators, and paint.

Possibly the most significant Bureau research contribution in the past decade occurred in fiscal year 1965—development of a process that may double this Nation's commercial-grade phosphate reserves. The method will permit profitable extraction of phosphorus from low-grade shales. When it is ready for commercial application, its widespread adoption could be an effective aid in the production of phosphate fertilizers, sorely needed to restore fertility to croplands in many parts of the world.

With the advance of mechanization, the work force that mines our minerals grows smaller but output per man increases. Each miner must be more highly skilled than was his predecessor. Thus, for economic as well as for humanitarian reasons our Nation has a stake in the skill and welfare of its miners. Bureau programs encompass safety research and safety education, evaluation and testing of mine equipment, and inspection of more than 9,300 active coal mines.

Bureau research traditionally has been aimed at minimizing primary mining hazards—falls of roof or ground, flammable gas, harmful gases and dusts, and dangers associated with mechanical and electrical equipment—the majority of which are encountered most frequently in underground mines.

Work on these primary hazards continues, but the Bureau also looks ahead to new dangers that must inevitably accompany future changes in mining technology. Studies already are underway, for example, to develop safe, efficient air-conditioning systems for deep, hot mines. These must be systems that will enable men to work under the increasingly high temperatures and humidities encountered as the quest for minerals is pushed to ever greater depths.

The challenge to stretch our mineral and fuel resources is ominous, in the face of the mounting population. These resources are both limited and nonrenewable. But man has not yet fully defined them; nor has he begun to approach the boundaries of his own creativity.

Geological Survey

Human ingenuity will inevitably supplement present mineral reserves, but more emphasis will be needed upon resource management and control. Scientific research can help stretch our resources and also can aid in weaving creative land use into conservation planning.

During fiscal 1965, the Geological Survey saw the yield from research efforts initiated several years ago, as mineral discoveries were brought into production. Continuing study was directed to problems that accompany population density—such things as water quality, floods and droughts, and geologic engineering hazards.

The broad scope of the Geological Survey's functions

includes chief responsibility for determining the distribution and quality of the Nation's water resources, minerals, and fuels; for surveying and mapping the land surface; for defining, by mapping and other studies, the character and structure of the rocks that underlie the surface; and for supervising the development of fuels and minerals on Federal lands under leasing laws.

Scientific techniques enable the Survey to make relatively precise inventories of resources, to discover new resources, to predict the results of various courses of action, and to indicate what course is most likely to yield the greatest benefits. In this work, the Survey cooperates with other Federal and State agencies and foreign governments.

The Geological Survey conducts studies of the processes by which mineral and mineral fuel deposits are formed; of new methods for finding useful materials and for extending the life of known districts. Other studies supply this knowledge to areas with known or potential resources. Evaluation of geologic factors that affect engineering construction, location of local sources of construction materials, and identification of geologic hazards all have immediate and practical value. These studies range from the Atlantic seaboard to Alaska, Hawaii, and the Antarctic.

Geologic Division Mineral Research supplements the familiar prospecting methods with complex scientific procedures that combine geology, geophysics, and geochemistry. The traditional pick of the lone prospector has given way to complex electronic machines, microscopes, and test tubes. Time, however, is a vital ingredient in bringing a major discovery into development. The interval between discovery and use is analogous to the time between planting and harvest, and it is a measure of the degree to which research must anticipate future needs.

Following are three examples of the harvest in mineral development during fiscal 1965. Each shows the value of sophisticated scientific techniques and the time required for development of a major deposit.

(1) At Pea Ridge, Mo., production began from a rich iron ore body, which promises to be one of the Nation's most important sources of pelletized iron ore. The Pea Ridge deposits were discovered as a result of a 1951 Geological Survey study. A map compiled from data gathered by the airborne magnetometer (then a new exploration tool) showed three areas in east-central Missouri characterized by the kind of magnetic field patterns commonly associated with iron ore deposits. Discovery of ore, beneath 1,300 feet of limestone and dolomite rocks, was made possible only because prior research had developed the airborne magnetometer. This instrument is now a standard proven exploration tool.

(2) The Carlin gold mine, near Carlin, Nev., was opened in 1965 and is now considered the largest new gold discovery of the past 50 years. Information on the geologic formations of the area, published in 1958 by the Geological Survey, led to exploration and drilling by a private company. This deposit contains an estimated $120 million in gold and is an important addition to known reserves.

(3) The East Tintic mining district in Utah was revitalized in 1965 as a result of Geological Survey research dating back to the early '50s. Production began this year from the Burgin ore body, a large, rich, deposit of lead, silver, and zinc. The geochemical techniques developed during these studies have vastly extended the life of this district and can be applied to many other areas.

Geological Survey research in economic geology during fiscal year 1965 included several resource discoveries from which major production is likely in the future.

Identification was made of molybdenum-bearing areas in the Sawatch Range, Colorado; iron prospects in northern Michigan; mercury in the Yellow Pine district of Idaho; "fossil" placer gold in northwestern Wyoming; and beryllium mineralization in Alaska, New Mexico, and Arizona.

Investigations are underway in Alaska's Brooks Range on important reserves of shale with high oil content and significant amounts of rare metals.

Humate, a black organic material present in great quantities in Florida gulf coast sands, has been found to hold economic promise as a fertilizer base.

Techniques developed and used by the Geological Survey materially reduce the time and expense of investigating potential mineral deposits. Analytic methods that can be used in the fields are guiding sampling and making results immediately available. Geochemical surveys show up indicator elements, thereby bracketing target areas for more intensive exploration. Several geochemical techniques for rapid field determinations were in use during fiscal year 1965.

Among the functions of the Geological Survey are: determining the distribution and quality of the Nation's water resources, minerals, and fuels . . . and surveying and mapping the surface of the land.

One of these, the atomic absorption "mercury sniffer," was developed to measure mercury concentrations to levels of only 5 parts mercury per billion of rock. Operated from a truck laboratory, this instrument offers leads to location of silver, which often occurs with mercury.

Wet chemical means for discovering gold, silver, and mercury have been developed for use at a truck-based operation close to the outcrop under investigation. The gold method, for example, measures concentrations as low as 3 cents worth of gold per ton of rock (30 parts per billion).

Bromine in salt deposits of the Paradox basin, Utah and Colorado, is being used as an indicator of the salinity of ancient lakes from which salt deposits formed. These bromine concentrations, measured by means of X-ray fluorescence, are a guide to valuable potash deposits, for potash is formed only from the most saline waters.

Geophysical methods are being studied to measure and interpret magnetic and gravitational fields. This information will furnish clues to subsurface geology and hidden mineral deposits.

A borehole gravity meter, to measure changes in the gravitational field with depth, has important applications to detection of oil and gas—both of which have relatively low specific gravity.

An index of diagrams of theoretical magnetic fields has been compiled by computer. These diagrams make possible

Field surveying

Measuring stream flow

Over 6 million topographic and geologic maps were distributed in a year

the interpretation of aeromagnetic maps and eliminate laborious, time-consuming hand computation.

The first gravity anomaly map of the entire United States was published in 1965.

A broad program directed toward understanding the geologic factors which influence the use of our greatest resource, the land itself, continued in fiscal 1965. Following are some of the results typical of the work in this field.

A seismic monitor network at Sunnyside, Utah, has reduced coal mining hazards by successfully predicting areas and times of special danger from spontaneous rock bursts.

A method for detecting underground cavities involves setting off small surface explosions and then recording on surface seismometers any trapped-air vibrations of large magnitude. Applications will include locating possible cavities under construction projects.

To assist the Atomic Energy Commission's Plowshare program for peaceful uses of nuclear explosions, the Survey has made detailed studies of the geology and hydrology of potential explosion sites and sites for test reactors.

Geologic studies in Seattle, Wash., Rapid City, S. Dak., and Pueblo, Colo., have located swelling clay layers that cause large-scale land movements.

Survey geologists, in Alaska following the 1964 earthquake, were instrumental in selecting new and more stable areas for dock and harbor facilities at Seward, in relocating the city of Valdez, and in selecting new sites for rebuilding parts of Anchorage. Evaluation of changes in land level showed the earthquake had raised or lowered more than 65,000 square miles of southeastern Alaska, the largest area affected in a single earthquake in recorded history.

A program of Upper Mantle Studies, initiated at the recommendation of the XII General Assembly of the International Union of Geodesy and Geophysics in 1960, is probing the outer 1,000 kilometers (approximately 625 miles) of the earth, which includes the earth's crust and upper mantle. Knowledge is sought about the flow of heat through the crust, about magnetic properties in rocks that trace the history of the earth's magnetic field, about gravitational variations, and about the deep flow of electricity within the earth. Concentrated field research in an east-west zone called the trans-continental Geophysical Strip, will yield the first detailed cross section of the continent.

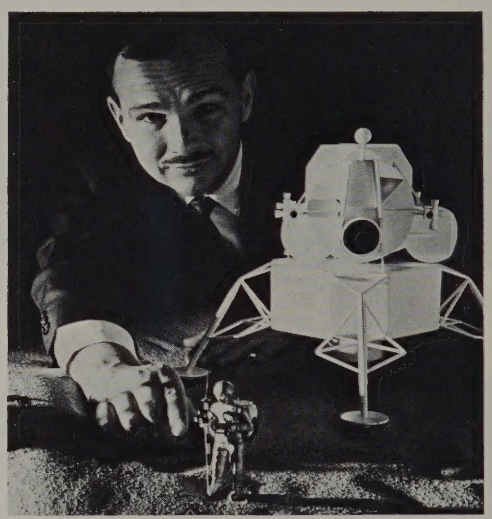
Major efforts are being directed toward predicting earthquakes. Investigations will concentrate on the San Andreas fault zone in the San Francisco area and extend north and west along the seismic belt that follows the coast of North America to Alaska and through the Aleutian Islands.

Investigations in support of the space exploration program of the National Aeronautics and Space Administration include lunar mapping, studies of impact phenomena, cosmic chemistry and petrology, and planning and instrumentation for lunar exploration.

Astronaut training in geology has been concentrated in volcanic areas and on meteor craters, which are probably analogous of lunar phenomena. Among the six scientist-astronauts recently chosen for manned flights is Harrison H. Schmitt, a geologist of the Geological Survey.

For more than two decades, the Geological Survey has helped newly developing nations appraise their natural resources and train earth scientists. The program has accelerated under the auspices of the U.S. Agency for International Development. In 1965, the Survey assigned 128 geological specialists to 17 countries at the request of their governments and provided or helped arrange training for 92 geologists and engineers from other countries.

Major efforts are being directed toward predicting earthquakes . . . and toward geologic activities in support of space exploration programs.



NASA

Examples of cooperative efforts with foreign governments in the field of geology include:

Studies of the disaster area caused by the 1963–65 eruption of Irazu volcano in Costa Rica, in an effort to control landslides and flooding on the ash-covered mountain slopes. One goal is prediction of future volcanic activity.

Preparation of regional geologic maps for Pakistan and the Philippines.

Geophysical investigations of Japanese calderas (volcano basins), leading to better understanding of volcanic processes.

People once lived without maps, but it wasn't easy. The Topographic Division of Geological Survey is charged with mapping the surface assets of our land. These maps also serve as a base for recording data on subsurface resources and as clues for additional resource wealth. Among the Division's major projects are completion by 1976 of the first map of the

Nation on the scale of 2,000 feet to the inch and the surveying and mapping of Antarctica. The latter project, being carried out in cooperation with the National Science Foundation, involves a continent which offers hope as a vast source of the raw materials the world may be needing quite desperately in years to come.

The former Office of Minerals Exploration recently became a part of the Geological Survey, and continues to carry out its assignments. Increased supplies of minerals are of paramount importance, not only because of economic growth, but also because of the requirements posed by new uses.

Small domestic mine operators have been an important factor in helping to maintain adequate supplies of vital minerals. To help assure continuing adequate mineral reserves, the Minerals Exploration Program encourages exploration by sharing with private industry the risk and cost of exploring for 35 mineral commodities.

Office of Coal Research

The abundant U.S. coal reserves are expected to make a major contribution to meeting our rapidly rising energy needs—as well as to provide an added source when shortages develop in some of the other forms of energy. Present and future populations will be needlessly deprived of the full benefit of this energy resource unless we develop new technologies for its utilization.

The Office of Coal Research (OCR) was established in 1960 to handle contracts for developing the technologies necessary for the various tasks which coal will be expected to perform.

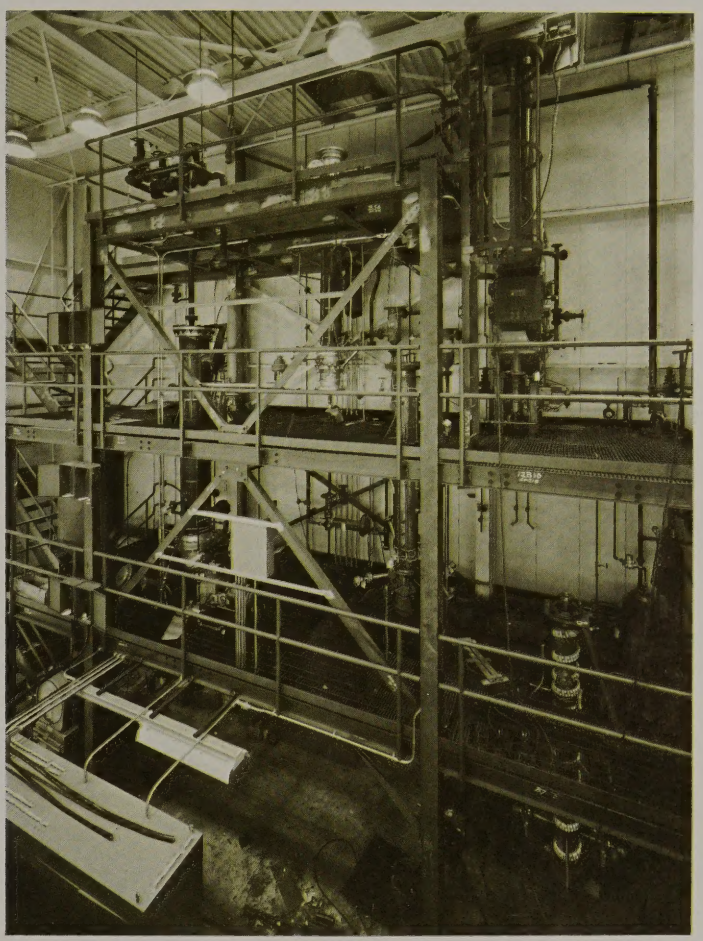
Projects for the conversion of coal to liquid and gaseous fuels are in various stages of progress. These include gasification of lignite, bituminous coal, and anthracite coal (to provide high-Btu pipeline gas and industrial gases), as well as projects for the conversion of coal to crude liquid fuels for refineries. The project for conversion of coal to gasoline has achieved sufficient technological and economic feasibility to justify the start of pilot plant construction.

New methods to improve utilization of coal in thermal power stations are highly desirable—partly to compensate for costs that are bound to rise on account of stricter requirements for reduction of air pollution and of thermal pollution of streams by discharge of cooling water, for example.

The demand for electric power is doubling every 10 years in geometric progression; more than 50 percent of present electric power supply is from coal-fueled generating plants. Projects for developing required technologies include improvements in the use of coal under electric utility boilers, and new methods for using coal in generating electricity, such as fuel cells and magnetohydrodynamics (MHD).

Of potential major importance to a pollution-beset population is the project for use of coal in sewage treatment. Lower in cost than other methods, this process is in an advanced stage. Pulverized coal has proved to be an excellent filter for removal of pollutants—including phosphates which have thus far not been removable by any other method. These phosphates, remaining in the mixture treated and discharged into streams and rivers, promote the growth of algae, which robs the water of its oxygen and often to the extent that fish life becomes impossible. The coal-sludge mixture produced by the coal filter process can be burned for energy purposes when it reaches a saturation point which makes it no longer efficient as an absorber of pollutants.

New ways are being sought for applying coal energy to the conversion of saline and brackish water, possibly in combination with power generation. Under an OCR contract the United States is being surveyed for locations where the economics are favorable for such dual-purpose installations.



Research programs of the Department are geared to meet the energy demands of tomorrow by exploring new methods today.

An OCR study underway is designed to develop ways and means to increase the availability of abundant western coal reserves.

Office of Minerals and Solid Fuels

Minerals and solid fuels would become critical resources should a national emergency or attack on the United States ever occur. The Office of Minerals and Solid Fuels (OMSF) cooperates with the Office of Emergency Planning in the stockpiling of metals and minerals for which the United States is dependent upon foreign sources of supply. Increased demand for raw materials to meet the growing needs of this Nation has necessitated a recent review of the potential supply of metals and minerals in relation to mobilization requirements.

The Nation's requirements for metals, minerals, and solid fuels have been met by the mining industry with a minimum

of economic controls or assistance from the Government. In the past year, however, the high level of economic activity has resulted in shortages. To meet consumer needs, emergency releases of a number of raw materials surplus to Government needs were arranged by the Government in cooperation with affected industries. Within the Department, the OMSF coordinated the work of releasing these materials to industry.

In event of a national emergency, special measures would be effected to step up production and establish control of the distribution of minerals and solid fuels. In order to carry out emergency actions in these areas, the Secretary of the Interior recently created the Emergency Solid Fuels Administration and the Emergency Minerals Administration and delegated emergency authority to officials of these new administrative units.

Office of Oil and Gas

In January 1965 the Office of Oil and Gas completed an appraisal of the U.S. petroleum industry, based on a population projection of 210 million people by 1980. Assuming that crude oil and natural gas will continue to serve about the same percentage of the energy market, a steady rise in oil consumption from the current 10.6 million barrels a day to over 17.5 million in 1980 is expected. Natural gas consumption may rise to nearly 26 trillion cubic feet, 12 trillion over 1963 demand.

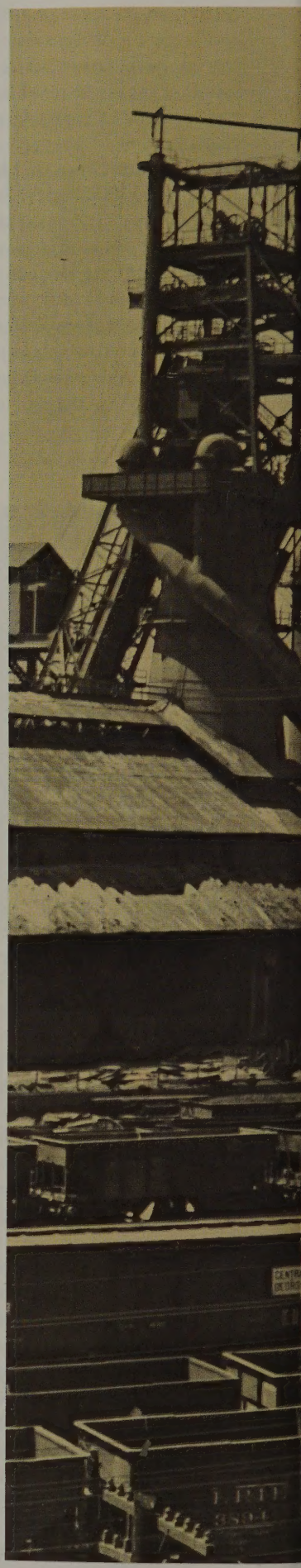
Estimating energy requirements to 1980, it was assumed there will be no significant change in the present oil import policy and that oil from shale or from tar sands will not yet be produced in significant amounts.

On this basis, U.S. production requirements through 1980 will aggregate 69 billion barrels of crude oil and natural gas liquids, and nearly 350 trillion cubic feet of natural gas. By way of comparison, in all the years between 1859—when oil was first discovered—and 1963, the United States consumed 73 billion barrels of oil.

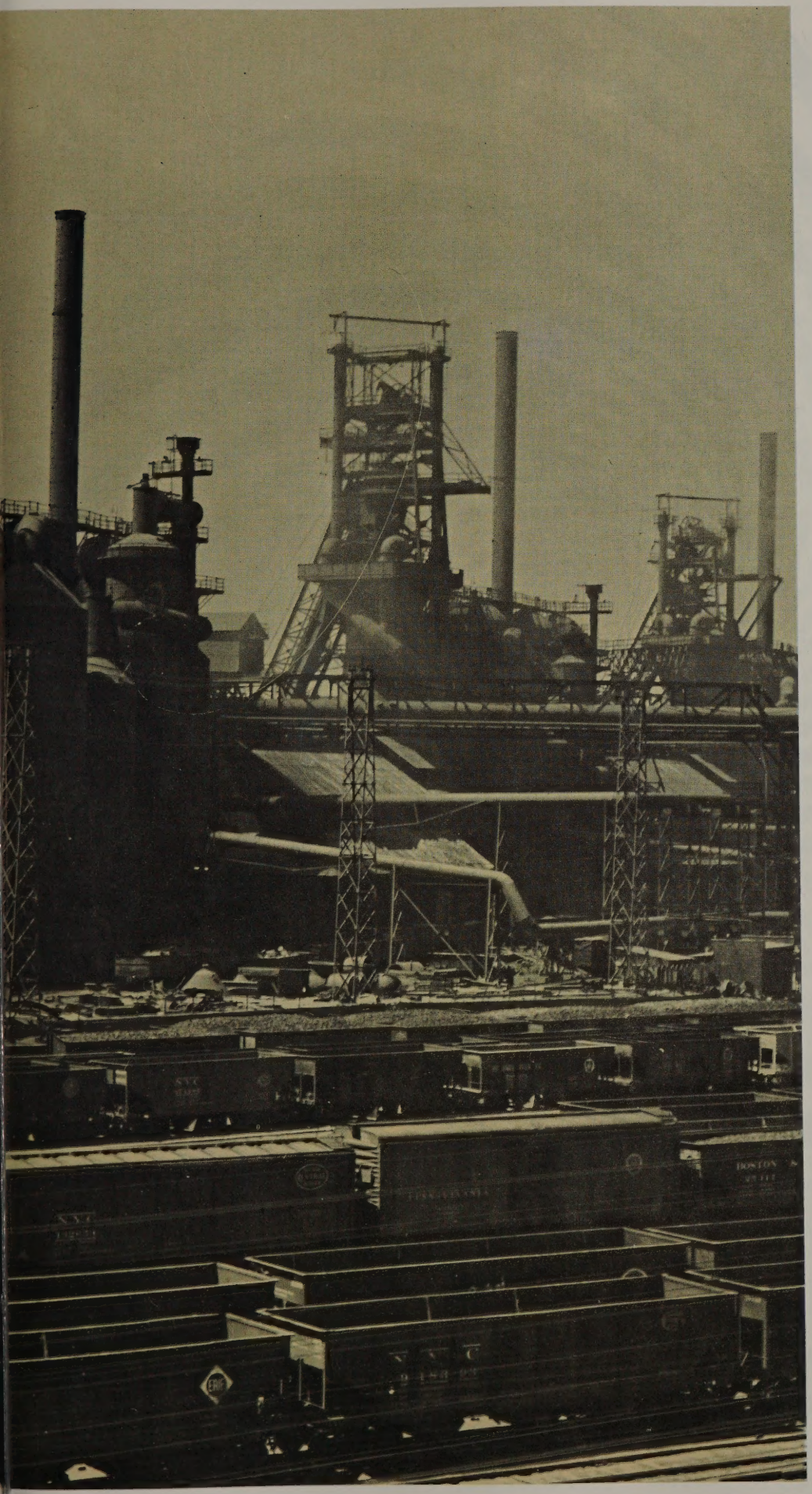
Economics, technology, and national policy will determine when alternative sources of oil from shale or from tar sands will be tapped to supplement present sources of petroleum hydrocarbons. Given enough time, effort, and money, the United States could produce all the liquid hydrocarbons it needs to fuel its economy for the foreseeable future, even if not another barrel of oil were found by conventional drilling methods. It appears that domestic natural gas resources will be adequate to meet the requirements provided the necessary exploratory effort is forthcoming.

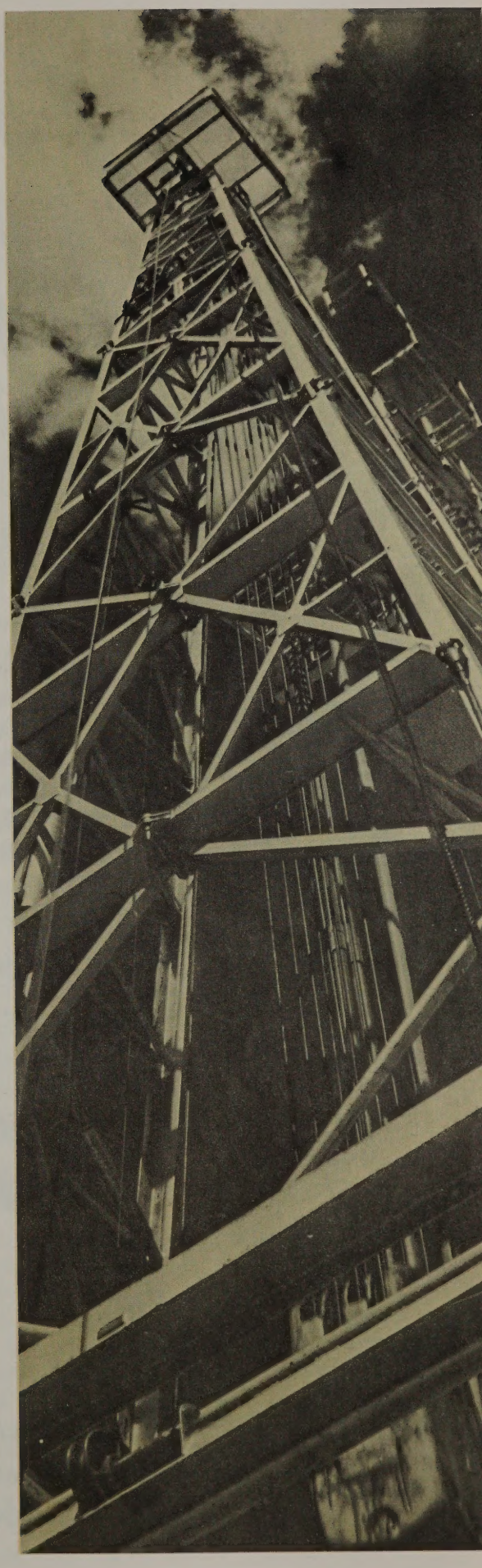
Oil Import Administration

To insure this exploratory effort here at home, the Secretary of the Interior was authorized by Presidential Proclamation to establish the Oil Import Control Program and the Oil Import Administration. The goal of this Administration is to insure a stable, healthy oil industry in the United States capable of exploring for and developing new domestic petroleum reserves to replace those being depleted. National security makes it necessary to maintain a healthy, vigorous petroleum industry in the United States.



Increased demand for raw materials to meet the growing needs of this Nation has caused a recent review of the potential supply of metals and minerals in relation to national emergency stockpiles.





Population Impact

"The Sixties are a time of turbulent, almost tempestuous action, a time of tearing down barbed wire, a time that will not wait."

Archibald MacLeish

People Needs

So far, this report has considered people only as the source of demands on natural resources. But the Department of the Interior also has responsibilities which directly involve people as such.

People unquestionably are the Nation's most important resource. But people, to fulfill their humane potential, must have the benefit of favorable environmental conditions. Unfortunately, these favorable conditions are still beyond the experience and the reach of many Americans.

The myth of unrestrained population growth as the golden key to prosperity and the good life has been vigorously challenged by the Secretary of the Interior. Instead, it is more likely to lead to poverty, degradation, and despair.

As a major pioneering step toward restraint of population growth, the Secretary on June 20, 1965, issued a directive to the Bureau of Indian Affairs and the Office of Territories, making family planning services available as part of the Department's social service program. In his testimony before the Foreign Aid and Expenditures Subcommittee of the Government Operations Committee on August 10, 1965, the Secretary said in part:

"I would like to take this opportunity to make the Department's policy crystal clear. What I have requested is that information and services for family planning be available on Indian reservations and wherever we have responsibilities for people programs. The use of these services is to be strictly on a voluntary basis and is to be comparable with such services generally available elsewhere in the United States today.

"Now just to make the record even clearer, I would like to restate the policy in terms of what it is not. *This is* not *an effort to arbitrarily control the growth of particular groups of citizens. Nor is it aimed at arbitrarily limiting the size of the Indian or the Territorial populations. It* is *aimed at opening the door of free choice thereby enlarging the measure of human freedom available."*

Bureau of Indian Affairs

There was a shabby day not long enough ago when Indian people were regarded as a group apart. Today they have improved opportunities to take their rightful place in the community of America.

The French nobleman, Alexis de Tocqueville, whose travels in 1830–31 led to the writing of his classic book, *Democracy in America*, observed that:

"The Indians have unquestionably displayed much natural genius. But—they have been ruined by a competition which they did not have the means of sustaining. They have become isolated in their own country—a little colony of strangers in the midst of a numerous people."

And little colonies of strangers many of them still are 135 years later—clinging to the lands they own partly because they love the land but partly too, because they fear and mistrust the society that surrounds them.

About 200,000 or more Indian people have left the reservation way of life and have become established in the cities and suburbs of America. But at least 380,000 still live on or near reservations from Florida to Alaska.

About 50 million acres of Indian-owned lands are in the trusteeship care of the Secretary of the Interior. Life and living in these areas is still rural, more typical of underdeveloped areas of the world than of contemporary America.

Increasingly, however, even the most remote of Indian communities are being affected by the changing society and economy of the United States. More and more it is being recognized that the handicaps of Indian people on the reservations are not essentially different from those of other poverty stricken segments of our citizenry.

The responsibilities assumed by the Federal Government on behalf of the Indian people are in many ways unique. A special Federal school system is provided to take up the slack wherever public school districts are unprepared to provide adequate services. A full range of Federal hospital and outpatient clinical services is provided (through the U.S. Public Health Service). Loans or grants for individual and group business, farming or industrial enterprises are available from a special loan fund, administered by the Bureau of Indian Affairs. Indian trust lands are tax-exempt.

Yet there is no group of American citizens which finds it harder to adjust to today's world. Nothing is more rural and isolated than the backlands of Indian country, where paved roads, electricity, and plumbing are as unfamiliar as they were 50 years ago. Small farming, once a means of livelihood for many, is no longer economically practical in this day of huge commercial agricultural enterprise. Cattle and sheep ranching is just in the beginning stages of revival.

Overgrazed and badly eroded lands are being reclaimed by conservation and irrigation projects as Indian people become aware of the economic possibilities of tribal ranching enterprises.

But many Indian reservations are located in regions where few if any industrial or business opportunities exist. The Bureau can and does build roads and bridges, and underwrites the cost of irrigation projects and agricultural extension services. But the more development work it does in cooperation with tribal governments, the more apparent it becomes that today's business and industrial economy is still far from the reservation world. Encouragement of new Indian generations to accept a changing American society from which there is no real escape only points up new social problems.

Aggravating the Indian poverty problem have been the comparatively high birthrate (42 per 1,000 among reservation

Ken Heyman—Magnum

National Committee for Children and Youth

Even the most remote of Indian communities are being affected by the changing society and economy of the United States. More and more it is being recognized that the handicaps of Indian people on the reservations are not essentially different from those of other poverty-stricken segments of our citizenry.

people, almost double the national average as a whole) and the declining infant and disease mortality rates (thanks to the intensive medical services provided by the U.S. Public Health Service). Reservation communities are confronted with the problem of limited resources and the continuing increase in the number of persons dependent on those resources.

During the past few years the Bureau has focused on development of educational opportunity, improved use of land resources, and establishment of small manufacturing enterprises on or near some of the reservations.

Some escape from poverty has been accomplished by Indian men and women who have acquired training and then moved off the reservations and into areas where job opportunities are more widespread. The Bureau encourages this transition—but does not force it—with a program of adult vocational education. All expenses, including travel, are paid for trainee and family during the training period, which may run as long as 2 years for highly skilled occupations. The demand for this training opportunity is growing so rapidly that it was necessary this year to ask Congress for the third increase in fund authorizations since the program's inception in 1958. This program, which started with a budget of $3.5 million annually, will now broaden to $15 million. A job placement service helps Indian people relocate and find suitable work.

On the reservations, the problem is how to subsist on a land base too poor to support the growing population by traditional means. The all-too-common reservation situation is well illustrated by Navajo land—24,000 square miles, largely desert and scrub, upon which nearly 100,000 people attempt to live. The population has risen 50 percent in a decade, and the increase still continues.

Herdsmen of fairly long tradition, the Navajos have found that income from grazing lands has declined as population rose. Irrigation and reclamation projects are now underway. But still, the individual family farm or ranch is a far less remunerative means of livelihood than is employment in the typical American commercial or industrial establishment.

Fortunately, the mineral resources, especially gas and oil, beneath the barren surface of the Navajos' land have produced a substantial source of tribal income. Although revenues are insufficient of themselves to support the population, nevertheless minerals revenues in recent years have provided from $20 million to $30 million annually—enough to give the Navajo Tribe a modest amount of capital.

Wisely, the tribe's governing body (elective) has chosen to invest these funds rather than distribute them on a per capita basis. The population is so large that annual income per member would be only a few hundred dollars.

Among the progressive measures instituted by the tribe is a $10 million scholarship fund, the interest from which provides upwards of 400 Navajo high school graduates each year with an opportunity to attend college.

An example of economic development is the Navajo Forest Products Industries, Inc., which capitalizes on the tribe's substantial timber stands. With an investment of more than $8 million, the Navajo Tribe built a sawmill, among the most modern in the world. Employment of Navajo workers in mill and forest is more than 400. And expansion into the manufacture of subsidiary wood products and derivatives is now planned.

The Bureau has been instrumental in helping Indian tribes attract private industries and businesses to reservation areas. The Navajo Highway Route No. 1 project has brought a million dollar motel and restaurant complex into Kayenta, attracting tourist dollars to the reservation and putting pay checks in the pockets of many Indians.

The tribe itself also has invested in operation of tourist

The changing horizon of Navajo land: traditional hogan in foreground; oil rig in background

accommodations at various points along the spectacularly scenic areas of canyonland. In mid-1965 a major electronics industry opened a plant in the New Mexico section of the Navajo reservation. Ultimately this will provide employment for 800 Indians, who will be trained on-the-job through Federal manpower programs.

Withal, poverty still plagues the Navajo people. The Bureau still expends more than $50 million annually on that reservation, to provide basic services not available through State or local governments because of the tax-free status of Indian lands. Bureau services include operation of elementary schools and some high schools, serving remote rural children and those who have special educational needs.

The tribal budget—approximately $20 million in 1965—goes into such development efforts as livestock and range improvements for the benefit of tribal cattle enterprises, development of water wells, rural electrification, and maintenance of law and order.

The crux of the Navajo problem lies in the limited educational attainment of most of the population. Until World War II drew thousands of young Navajos into the armed services, little regard had been given to formal education by this tribe. Indeed, there had been little chance for many of the young men to go to school even had they wished to—living as they did in the hinterlands.

As a consequence, most older adults even today are unable to read or write English. At the close of the war, several thousand youngsters approaching their teens who had never been to school, participated in a special 5-year program at seven schools, including the famous Intermountain School in Brigham City.

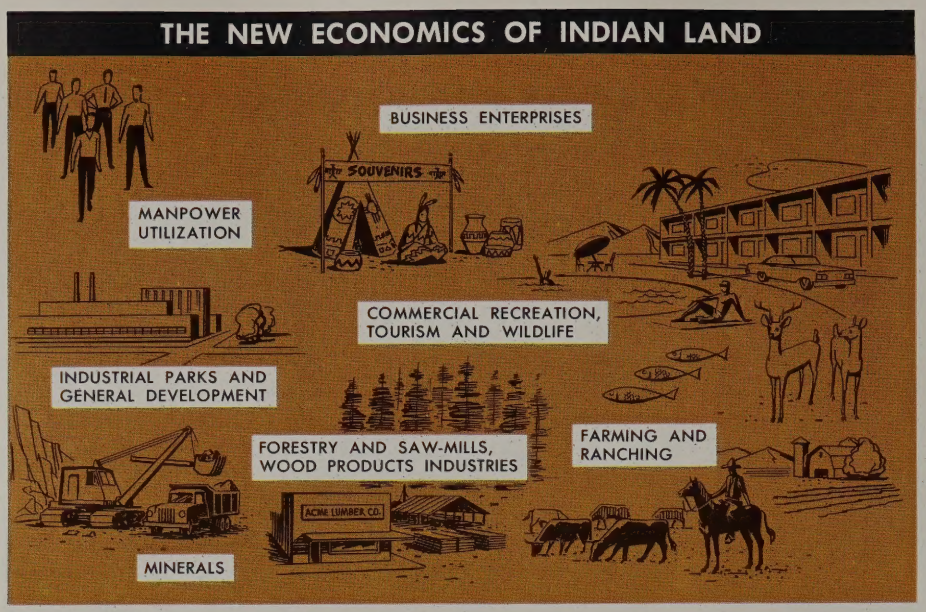
But even today, too many children of school age have no place to go because the number of classroom seats available has not kept pace with the number of children who need educational opportunity.

While the Navajo situation offers examples of problems faced and progress made, the many variations among Indian tribal customs and cultures create differing problems. The key word in seeking solutions is "flexibility." Particularly vivid are the contrasts between the Navajos and their neighbors in the Pueblo communities.

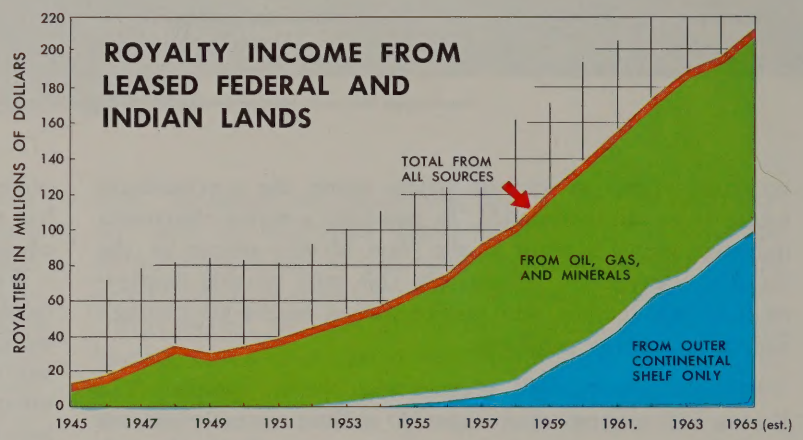
The agricultural Pueblos, occupying two sides of a triangle in New Mexico—roughly from Gallup eastward to Albuquerque and then north beyond Santa Fe—are located in a growing tri-city area. The value of their land for farming and ranching is little more than marginal, but its value for urban development increases year by year. The majority of these people, however, have not yet accepted the idea of leasing their land for long-term development. These clay lowlands and rock mesas are their home and they cling to their land and to their ancient traditions even though surrounded by a relatively prosperous society.

Yet even among the most withdrawn of tribal groups, change is coming about. Nearly 3,000 Northern Cheyennes in Montana—descendants of the few hundred who survived the bitter, bloody trek from Oklahoma nearly a century ago—own land excellent for cattle grazing. Some of it is forested; some of it holds promise for recreational development. Only in the past 4 or 5 years, however, has the tribe commenced to emerge from a state of underdeveloped rural life.

With the enthusiastic help of an agency superintendent who is himself Indian—a Sioux with a master's degree in education—the tribe has moved ahead in several directions. About 50 or 60 Indian families now are running cattle under supervision to help them avoid mistakes that might result in financial failure. A housing authority has been established,



The Bureau has been instrumental in helping Indian tribes attract private industries and businesses to many of the reservations.



as a first step toward elimination of the ramshackle homes—an all-too-common symbol of Indian poverty and deprivation.

Tribal income, some of which is apportioned to families for home improvements, financed several new structures this year, and Public Housing Administration funds have financed others. Family members frequently contributed labor in lieu of cash as equity under a special PHA plan for Indians. Tribal funds also have financed and built a factory leased by an arts and crafts firm which employs over 100 Northern Cheyennes.

Tourist accommodations in the form of campgrounds and recreation areas have been built with tribal funds, and revenues from fishing permits add to the tribal till. Timber reserves offer another potential source of tribal revenue and Indian employment.

These budding activities on the Northern Cheyenne Reservation, and the developed enterprises on the Navajo Reservation, illustrate the efforts to relate human development to resource development. Similar activities can be found in many Indian areas.

Bureau guidance and aid are typified as follows:

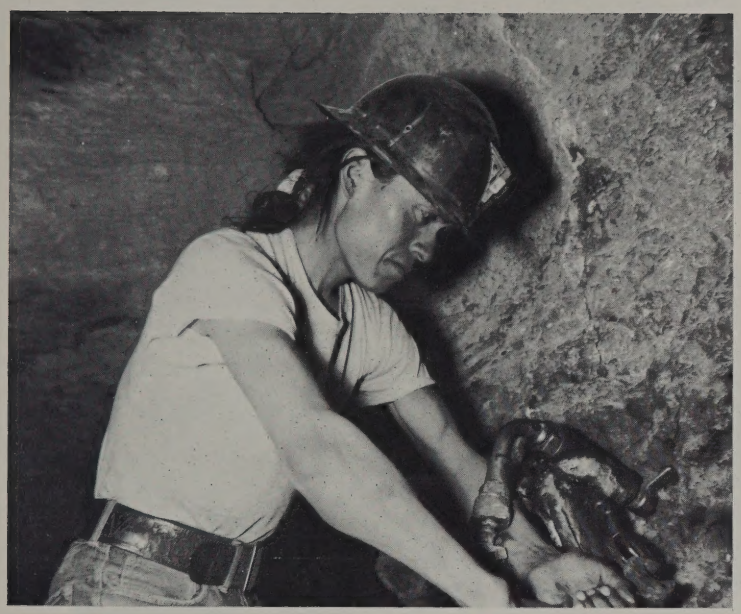
Education: The lion's share of the Bureau's $210 million budget for fiscal 1965 went into community services, chiefly education programs and school construction.

A staff of social workers assigned to each reservation form a corps of advisory aides to programs such as housing and law enforcement, as well as carrying out their primary function of family assistance and counseling. They work with State and local agencies in the growing program of foster care and adoption of Indian children.

Education programs now include beyond-high-school technical training as a doorway to employment, experimentation with new methods for effective and speedy learning of English, help for the mentally retarded, increasing grant and loan aid for higher education, summer remedial and enrichment programs for school children of all ages, and encouragement of arts and crafts.

For school age young people, the aim is to fill the gap between opportunity and need. The trend has been to move swiftly in the direction of public schooling. More than 100,000 Indian children are in public schools and about 48,000 are in Bureau schools in those States where the Bureau has trust responsibility. But meanwhile, the school-age population continues to rise—not only because of high birth rates but because there has been a reduction in rate of dropout from the upper grades.

Fifteen years ago, the Bureau's census tallied 30,000 in public schools and an equal number in Federal schools. The Bureau has made a special effort to reduce dropout rates and to develop



Education programs now include beyond-high school technical training as a doorway to employment for the young. The aim is to fill the gap between opportunity and need.

special abilities by special programs. The Institute of Arts at Santa Fe, for example, provides intensive counseling coupled with a curriculum designed to nurture talents and interests of individuals with aptitude for arts and crafts.

Most of the Bureau's schools are in the Southwest where the Indian population is heaviest. Some public school districts are being established on Indian reservations and Federal funds are available to help defray costs of Indian education in needy public school districts. The Bureau also maintains dormitory facilities for Indian students from remote rural areas to enable them to attend public schools.

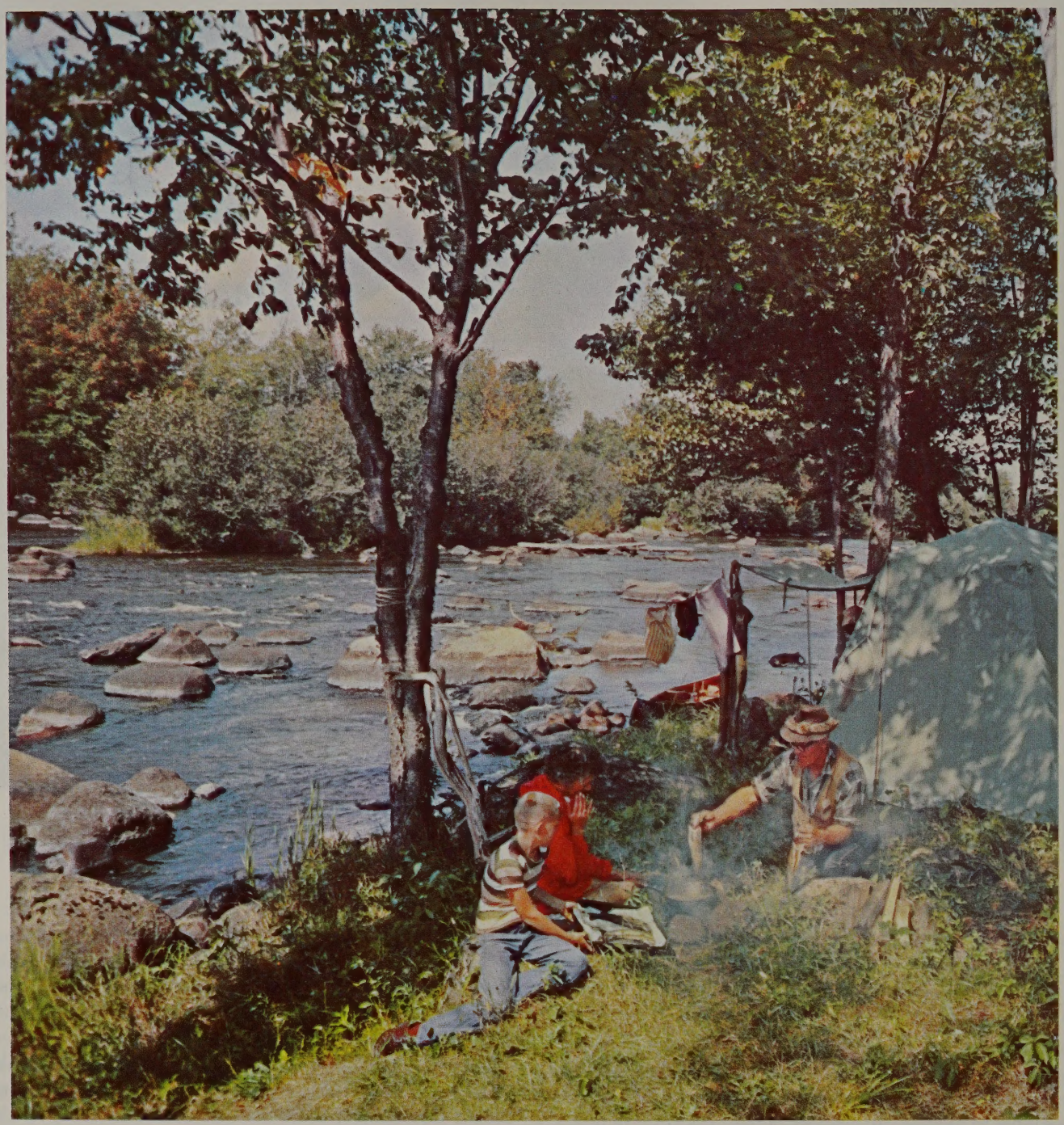
Economic development: In this direction, too, the budget has risen dramatically over the past 10 years. More than $42 million was used in fiscal 1965 for economic development of reservation lands. This is approximately three times as much as 1955 and double the amount so used in 1960.

Several measures were introduced in 1965 to extend provisions of the Indian Long-term Leasing Act to areas not covered under existing legislation. The purpose would be to make Indian areas more attractive to commercial developers. Bureau real estate appraisal services are resulting in increased return from sales and leases of land.

Executives of several major fields of business in 1965 sponsored meetings of business leaders to inform them of industrial development opportunities in or near reservations. As of June 1965, 46 plants were in operation and 11 more under construction.

Tribal income has been supplemented in many instances with judgment funds in connection with Federal land-takings during the 19th century. Established in 1946, the Indian Claims Commission made its first award in 1951, and since that time 71 tribal groups have received sums ranging from several thousand to several million dollars in judgments. In fiscal 1965 alone, $59,887,000 was awarded to Indian tribal groups, bringing the cumulative total to $168,958,000. With advice and assistance from the Bureau most groups are programming these moneys for community developments such as recreation and adult education activities and construction of tribal facilities.

Because tribal leaders are assuming increasing responsibility for administration of tribal affairs; the Bureau sponsors training programs for these leaders. In 1965, 16 such programs were financed—most of them at State universities—in such diverse fields as communications, business management, law enforcement, and so forth. Tribal leaders have been influential in bringing about greater involvement of their people in "self-help" programs. For example, 73 tribes have estab-



Tourist accommodations in the form of campgrounds and recreation areas have been built with tribal funds, and this recently developed source of revenue adds to tribal income.

lished housing authorities—a necessary vehicle for members to obtain low-cost public housing loans.

Supplementing Bureau assistance to reservation communities has been the Economic Opportunity Act which went into effect in the final months of 1964. By June 1965, Indian participation in its various programs was substantial enough to indicate a trend toward fuller participation in activities involving society as a whole.

For the few months that the Economic Opportunity program was operative in fiscal 1965, the Indian participation record included: 10 Job Corps Centers on Indian reservations, application for Neighborhood Youth Corps funds by 78 Indian communities to benefit more than 9,000 Indian boys and girls, 20 applications for Operation Headstart funds of which 18 were approved to benefit 1,600 children, assignment of 18 Volunteers in Service to America (VISTA) to work on Indian

reservations, and 61 applications for Community Action Program (CAP) funds, of which 26 had been approved by the end of June 1965.

The nature and intensity of Federal programs for Indians, specifically those Indians whose lands are in trust status, reflect the urgency of need for establishing better balance between the human and the natural resources of our Nation.

The Department's aspiration for the Indian people are their aspirations; for a life in which they can become leaders rather than the led; doers rather than bystanders; controllers of their future rather than drifters buffeted by the winds of social change.

American Samoa

Until the fall of 1961, American Samoa met its problems of expanding population by exporting the best of its young people. Because of the lack of adequate schooling and economic opportunities, Samoans by the thousands emigrated to the mainland United States and Hawaii between the end of World War II and 1962. Thus, even though its birthrate was one of the highest in the world, American Samoa maintained a fairly stable population.

However, with the dramatic improvement of all public facilities, including education, in the fall of 1961 this outward flow of young people slowed down and by 1965, the number of emigrants had ground to a halt and, to a slight degree, had even reversed itself.

Lands for expansion of agriculture are extremely scarce. No known mineral resources exist, and the distance from sources of raw materials and consumer demand are so great that manufacturing possibilities are slim. The obvious resources are the beauty of the islands, their central location in the South Pacific trade routes, their fine harbor and jet airport, and their excellent fishing opportunities.

For the past 3½ years the islands have prepared themselves for tourists. The Samoan people have organized their own development corporation and by autumn 1965, they had completed the finest luxury hotel in the South Seas. The architecture exemplifies the Samoan way of life, yet includes all luxury items and conveniences the most discerning tourist could wish.

The legislature has authorized a substantial park development program and enacted ordinances designed to preserve the beauty of Polynesia in Samoa. This assures constructive recreation and entertainment opportunities—not only for visitors but for the local citizenry.

Agricultural production is limited, but the extension service is working with the people, teaching modern techniques to improve existing crops and developing interest in new ones. The fishing industry is being encouraged to expand its fleet. Pago Pago is one of the important fish processing centers of the Pacific islands.

The year-old educational television project is an unqualified success. Its expanded continuation assures Samoans the educational opportunities necessary if they are to compete economically and socially, both in Samoa and in the United States. When the three additional channels are completed, excellent instruction will be available through grade 12. The system is regarded as a model for developing areas the world over.

While these measures will go a long way to meet the population problem in American Samoa, the Government recognizes that if the unusually high birth rate continues, a serious, if not impossible, strain will be placed on the economy, health, and well-being of the entire population. Therefore, as fiscal 1965 closed, the Government established family planning service for families wishing to avail themselves of such help. A new medical director and public health officer, both with experience in family planning service have been employed. The Department is confident this new program will, in time, be highly beneficial.

Guam

A total population of 108,600—military and civilian—is projected for Guam by 1985, with an increase in the civilian population from the present 53,900 to 85,100 in that period.

With these figures in mind, the government of Guam is nearing completion of a comprehensive 20-year plan for island development. The plan will provide guidelines for establishment of community facilities, designate all future land use on the basis of community goals, and program such short-term projects as zoning, budgeting, and subdivision control. The plan is the basic design for overall development. In addition, each department of the Guam government has drawn up a 5-year plan for program and facility development.

Under a program to rehabilitate and reconstruct the Territory from the wreckage of 1962 typhoons, Guam will have obligated nearly $29 million of Federal and local funds by July 1, 1966. Ten new schools and two new college buildings will be almost complete by that date. Various new public facilities—schools, public works and utility headquarters buildings, a penitentiary and juvenile home—will be erected. A new air terminal will be complete. First steps will have been made toward a $10 million commercial port.

Economic development is the prime target, with emphasis on tourism. A 1,300-passenger cruise ship has made Guam a port of call; a first-class hotel is planned. A strong Farmers' Cooperative has been organized and is now active. Acreage devoted to crops is growing.

However, the Territory remains dependent upon imported foodstuffs and there is no immediate prospect that even a redeveloped agriculture will be capable of satisfying food demands on Guam. Private efforts are underway to establish large-scale agriculture on neighboring Trust Territory islands to help supply Guam's population.

Public utilities are expanding to meet demand. Construction has begun on a multimillion dollar sewer and sewage-treatment system in central Guam; new water sources are being developed which eventually will triple the present available water supply; new power transmission lines now in the design stage and new generation capability will be available as demand builds. Power development depends largely upon the military commands which have primary control over power-producing facilities. With the advent of trans-Pacific

The American Samoan Development Corporation's new hotel rises on Pago Pago Bay.

cable to Hawaii, Japan, the Philippines, Australia and Hong Kong, message tolls have nearly tripled. Urban renewal programs and corollary public housing projects are in process. Public and private efforts to develop typhoon-proof housing will continue.

The College of Guam, a 4-year, liberal arts college, has now received accreditation for a 3-year period. Guam's Memorial Hospital, reconstructed with some $1,430,000 in renovation and repairs of damage from Typhoon Karen, has received initial accreditation, also for a 3-year period.

Providing schooling and vocational training for an increasing number of students will test the capabilities of the Territory. Guam projects a total investment of some $14 million in school facilities alone through 1970. Primary and secondary public school enrollment for the 1964–65 school year was about 16,000; estimates are that enrollment will rise to almost 20,000 by 1970.

The Territory's civilian work force is expected to total 22,500 in 1970. Through trade, vocational and apprenticeship training programs now in force, hundreds of Guam youths will receive job training.

The island has been blessed with great natural beauty and outdoor recreational potential. One major public beach has been developed; others are planned. Guam seeks the establishment of a national park that would help preserve recreation areas, historic sites and materials, and native flora and fauna. Federal and local programs to survey and plan for development of parks, recreation and historic areas were begun in 1965.

Guam's location fits it for an enlarging role as transportation and communication link between the western Pacific and mainland areas; its transportation, communication, finance, education, and medical facilities make it the natural center for the developing Trust Territory islands.

Trust Territory of the Pacific Islands

Steady progress in the economic, educational, and social opportunities of the 88,000 people who inhabit the 700 square miles of the Trust Territories has been made during the past few years, although administration is difficult. The relatively few square miles of land are scattered in the form of some 2,100 islands in an ocean area of 3 million square miles.

The population of the Trust Territory of the Pacific Islands is growing at an annual rate of 3 percent. This rapid population increase has necessitated increased appropriations for accelerated programs. Following are some highlights.

During the past year 250 new elementary classrooms were

New emphasis on education and the development of tourist facilities promises a brighter tomorrow for the people of our island trust territories.

Construction of tourist accommodations is underway in the out-islands of Koror.

put in use and 88 additional American teachers joined local staffs. Three years ago the Territory had only 1 public high school with 150 students. This past year, 6 district public high schools, grades 9 through 12, and 2 subdistrict high schools up to grade 10, were serving 1,980 students. Public high school enrollment for the 1965–66 school year will reach 2,500.

The fishing industry has scored one of the most important economic advancements. At last the vast resources of the sea are being tapped. In the first successful commercial fishing operation under U.S. administration, the goal of providing Micronesians with a steady income and training for a permanent fishing industry is rapidly becoming reality. Far-sighted legislation and modern conservation techniques are returning the reefs to productivity.

A territory-wide road-building program is providing access to large tracts of government land for homestead projects. Maximum use of existing land resources to meet the needs of ever greater numbers of people is evident in three new housing authorities. Long-range plans are underway for increasing reservoir and water treatment facilities, for modernizing power generating facilities and water and power distribution systems, and for sewage treatment plants.

With the sitting of the newly-elected Congress of Micronesia in July 1965, the nation-building aspect of the Administering Authority's program has borne fruit. The Congress has completed a workshop in law-making under guidance of a team from the University of Hawaii's East-West Center. The Secretarial Order which established the Congress gives it wide legislative authority, including the power to levy taxes. Undoubtedly the people of Micronesia will press for an even greater acceleration of development of their country when this new legislative body becomes fully involved in the business of law making.

The Virgin Islands

The 1960 census recorded the resident population of the Virgin Islands at 32,000. On June 30, 1965, the population, including alien workers and the rapidly growing number of part-time residents was estimated at 50,000 and probably will be more than 60,000 by 1970.

As a result, it has been difficult to meet the growing needs for classrooms, hospital beds, housing, power, water, teachers, nurses, and other important facilities and personnel. Nevertheless, the Virgin Islands have made headway in all areas through the planned conservation and development of their resources—natural, historic, and human.

Training in the professions and trades is given to these Virgin Island high school students.

Our most important national resource is people. . . . The education of our youth, in preparation for a place in the Nation's future, is underway . . . from our island trust areas to our mainland Job Corps Conservation Centers.

Lacking in important mineral, timber, or other raw material resources, the Virgin Islands must make the most of their soil, underground and surface water, their beaches, harbors, the seas around them and the creatures inhabiting those seas. Together with an almost faultless climate, these add up to a substantial potential for development of tourism and selective possibilities for establishment of other industry.

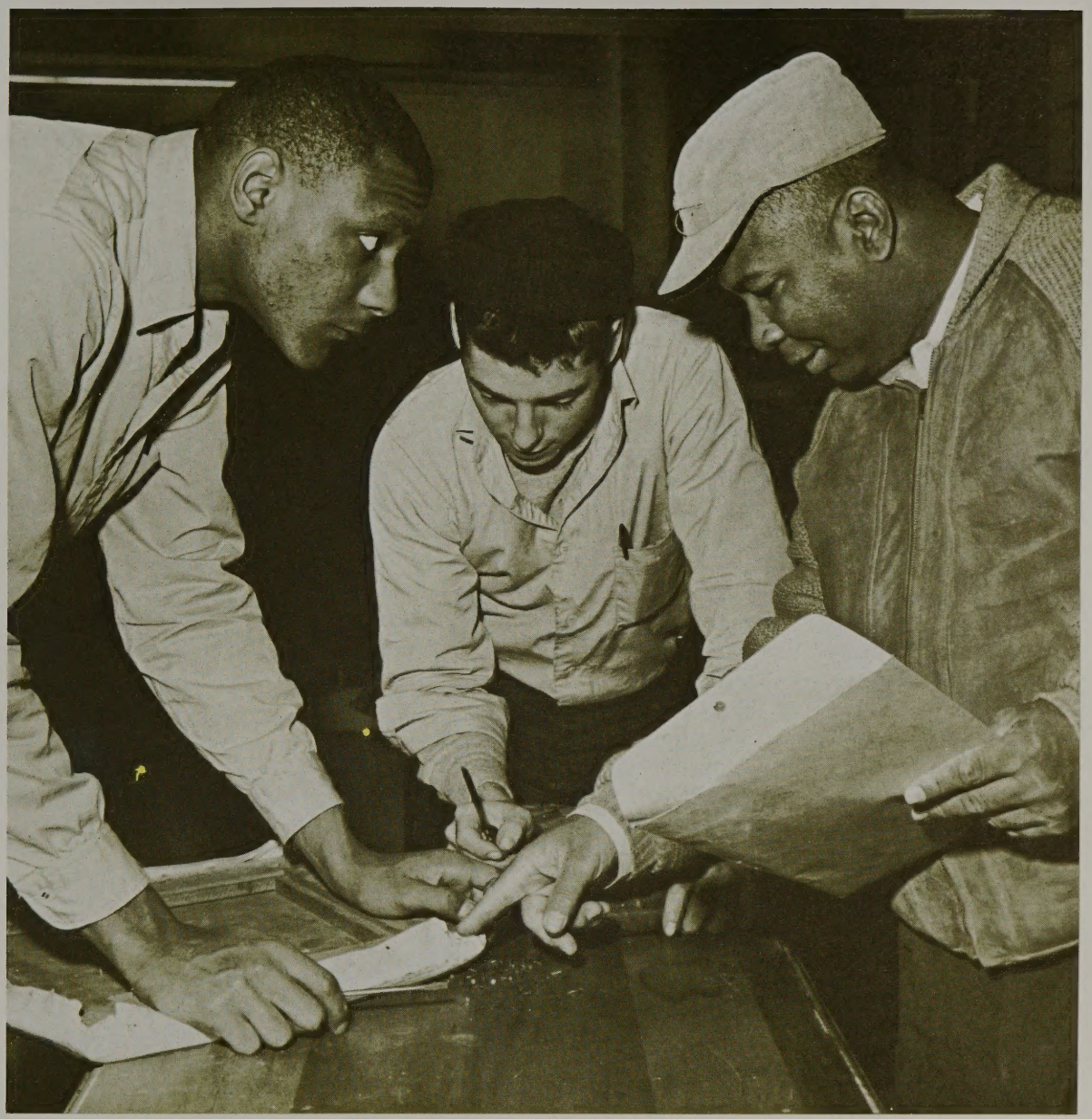
Following a Geological Survey study of underground water resources, the legislature recently passed a law controlling their use. In addition, the territorial government has pioneered the use of desalinated seawater and soon will be supplying most of the public need from that source.

The legislature also has adopted "model" soil conservation legislation. Under that law, local government is cooperating with Federal authorities on a long-range program of soil conservation and agricultural development.

Priority is being given to plans for reconstruction of the agricultural economy on the island of St. Croix. Sugarcane, the only important crop heretofore, has been a marginal one, costing the local government large sums to make up milling losses. For several years sugar has gone through a phasing out period and will be terminated as a commercial crop next year. This raises the question of the future of 113 farms—4,000 acres of prime agricultural land. The Caribbean Research Institute has filed a preliminary report recommending its use for food crops instead of for residential purposes.

As elsewhere, the most important resource of the Virgin Islands is its people. In the preservation of health, the development of education, the replacement of slums with modern housing, and in the creation of a high standard of living, the Virgin Islands stand out as a beacon in the Caribbean.

Hospital and public health services have been improved annually. Two multimillion-dollar health centers will be built during the next few years. Elementary and secondary schools have been upgraded, and the new College of the



Job Corps trainees receive instruction in many trades.

Virgin Islands has just given diplomas to its first 2-year class. Progressive teacher and nurse training programs now are being added to a comprehensive plan of professional and technical training. The territorial government is floating a $4.2 million issue of general obligation bonds for a school construction program. More than 7,000 persons have been resettled from blight areas in public housing projects financed by Federal and local government funds.

Job Corps Conservation Centers

Conservation work, becoming more essential with each year's national growth, is being accelerated at a time when a large number of unemployed workers is available. Youth with nothing to do is being matched with lands on which nothing is being done. Today there are more young citizens relative to the total population than ever before, and the rate of unemployment in the ages between 16 and 21 is the highest of any age group; in fact, it is twice the national average.

In 1965, Congress passed the Economic Opportunity Act. One of the several programs authorized by that act is the Job Corps, which enrolls young men and women, age 16 to 21, for the purpose of furthering their general education, providing vocational training for skilled employment, and making it possible for them to gain work experience. Part of the Job Corps enrollees are assigned to large training centers and part to Conservation Centers. These Centers, located in areas where important natural resource work needs to be done, relate resource conservation and training to work and educational programs. Conservation Centers are being established on Federal lands such as the National Parks, National Wildlife Refuges, Indian reservations, Bureau of Reclamation projects, on the public lands, and in the National Forests administered by the Forest Service of the Department of Agriculture.

"The concern is not with nature alone, but with the total relation between man and the world around him. Its object is not just man's welfare but the dignity of man's spirit."

President Lyndon B. Johnson

Here, and on State land too, there is a great backlog of conservation work. The tasks now being performed by the Conservation Centers supplement existing functions of the Federal and State governments.

The Civilian Conservation Corps, in operation from 1933 until 1942, planted 3 billion trees and constructed 1 million miles of roads and trails. Some of its improvements are still in use. The present Job Corps Conservation Centers are making the same kind of contribution, but in addition, they provide for basic education as well as work experience and certain types of training.

The first Job Corps Conservation Centers were opened early in 1965; the present schedule calls for establishment of 80 camps before July 1967. Distribution of the camps will be nationwide. Less than 1 year after the beginning of the Conservation Centers work-experience program, enrollees began to take their place in the national work force. As the number of Centers increases a continuous pool of young workers will be available for employment on projects, both public and private, aimed at conservation of the land, water, and living resources of the United States.

Equal Opportunity Drive

Designating himself as the Department's chief equal opportunity officer, the Secretary of the Interior in August 1965, launched a new, aggressive effort to guarantee equal opportunity in all the Department's programs. On that occasion he said:

"The importance and urgency of equal opportunity has been stressed again and again by the President and by actions of Congress. These facts, plus my own strong convictions regarding equal rights, compel the investment of the full authority of my office in the development and management of all Departmental matters relating to equal opportunity."

The equal opportunity directive was aimed not only at job opportunities within the Department, but at outside programs for which the Department is responsible. The Secretary noted that the Department's construction contracts total nearly $898 million, and that it is operating 13 Job Corps Centers, in addition to hiring 70,000 employees. "In each case," he said, "our duties demand outstanding Department dedication to equal opportunity goals."

Clearly, the Department of the Interior's responsibility in primarily "people" programs is almost as varied as its resource responsibility. That the one ties in closely with the other is also evident.

The Organizational Setting

The programs outlined in this volume are carried on under the immediate supervision of the Secretary, Under Secretary, and five Assistant Secretaries. Responsibilities assigned to each Assistant Secretary are as follows:

Assistant Secretary for Fish and Wildlife and Parks in the areas of development, conservation, and utilization of the fish and wildlife resources, and the national parks of our Nation.

Assistant Secretary—Mineral Resources in the areas of development and utilization of minerals and fuels, including geology, mapping, oil imports, geographic names and defense mineral activities.

Assistant Secretary—Public Land Management in the areas of outdoor recreation, land utilization and management, Indian affairs, territorial administration, and the Alaska Railroad.

Assistant Secretary—Water and Power Development in the areas of water resources development, electric power distribution and marketing, and saline water research.

Administrative management functions within the Department are supervised by the *Assistant Secretary for Administration.* These include: Budget, finance, management research, automatic data processing, personnel, audit, and related management activities.

Other organizational units reporting directly to the Secretary and Under Secretary include: *The Science Advisor to the Secretary*—charged with consultation, advice, and coordination of the Department's research program; *the Resources Program Staff*—providing staff assistance to the Department's Secretariat in development and implementation of policy and in formulation of long-range objectives and programs pertaining to natural resources; *the Office of the Solicitor*—providing legal assistance to the Secretary and other departmental officials.

"I am suggesting that the United States set an example of how to plan the best relationship of human beings to their environment . . . the man-to-land ratio which would result in the highest and best development of the land and of free men."

Stewart L. Udall, Secretary of the Interior

Everglades National Park, Florida

USAF

Richard N. Kauffman

The Sierra Club—"Gentle Wilderness"

Yosemite valley floor

Planning for the Pinch

Conclusion

In a nation which has begun to feel the pinch of a rapidly expanding population, the key word is "planning." The Department of the Interior, supported by a Congress which recognizes that conservation has no political coloration, has moved in every area to plan ahead.

In 1965 the need for planning came crowding in on all fronts. Great sections of the Nation suffered devastating floods; other sections underwent withering drought. Endangered species of wildlife slipped still farther down the slope toward extinction. Prime park areas experienced such heavy visitation that in many cases they lost their original flavor.

In Interior's area of nature responsibilities, resource planning has long been considered necessary and urgent; in Interior's area of human responsibilities, family planning service has been made available to those who voluntarily request such help.

President Johnson, on July 22, 1965, during the ceremonies

Richard N. Kauffman

The Sierra Club—"Gentle Wilderness"

Merced River, California

accompanying the signing of the Water Resources Planning Act, said this:

"I was asked the other day what took most of my time as President, and I could answer without hesitation in one word: planning—planning—planning.

"We just don't realize enough how pressing, and how urgent, and how critical it is for us to be planning today for America's future needs tomorrow—needs 10, 20, 30 years hence, when this Nation will have three people for every two that we have today."

Looking toward that day, the well-known British historian Arnold J. Toynbee, in an address to the World Food Congress which met in Washington, D.C., in June of 1963, said:

"We must aim at establishing the planet's population at a figure that will allow a substantial part of our time and energy to be spent, not on keeping ourselves alive, but on making human life a more civilized affair than we have succeeded in making it so far."

Discussions of resources versus population pressure often come to a complete impasse. The quantity of resources on this planet is finite. The biological potentialities of population increase are infinite. But until the impasse is ended and some solution becomes politically and socially possible, it is the responsibility of such agencies as the Department of the Interior to see that every effort is made to meet the short-range problem—the stretching of our resources to meet the mounting demands.

The chain of life, often incredibly tough, sometimes proves a fragile thing. We are stretching it in places to the breaking point. The planning that is required to keep it intact sometimes involves even longer lead time than space projects. And as the population mounts, time is running out. We can get off this planet, with herculean effort, for as long as several weeks at a time. But we must take with us the air, the fuel, the food and water we need to survive.

And eventually, we must return.

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"Let us in all our lands . . . including this land . . . face forthrightly the multiplying problems of our multiplying populations and seek the answers to this most profound challenge to the future of all the world. Let us act on the fact that five dollars invested in population control is worth one hundred dollars invested in economic growth."

President Lyndon B. Johnson
United Nations Speech, June 25, 1965